The Tennessee EdTech Accountability Model (TEAM)

An Application for a Federal Discretionary Grant:

Evaluating State Education Technology Programs (ESETP)

Tennessee ESETP Application (CFDA 84.318A)

Due Date: July 28, 2003, 3:30 Central Standard Time
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Program Abstract

The proposed project is being developed to improve Tennessee's capacity to conduct rigorous, scientifically based, high-quality evaluations of its educational technology interventions by developing an evaluation protocol that meets these needs. While the TN Department of Education has developed and implemented a number of educational interventions that incorporate technology applications to improve student outcomes, particularly in core academic areas, it has chosen to focus the efforts of this grant on an innovative professional development program whose implementation will begin in the fall of 2003.

Intervention: The Tennessee EdTech LAUNCH[1] (TnETL) grew out of an earlier competitive grant program to prepare home-grown technology coaches to plan and implement comprehensive, school-based professional development programs for teachers in their own schools. TnETL's goal is to integrate the use of technology as a tool into curriculum and instruction to prepare students to meet state academic standards. Coaches work with teachers on methods of aligning technology use to the delivery of the curriculum using instructional materials that foster increased student achievement. Participating schools commit resources, pledge to sustain the program, and guarantee that they will continuously evaluate the program and its outcomes. In year 3, schools that have implemented the intervention will compete to serve as regionally-placed ORBIT[2] Centers, providing professional development to teams of teachers from partner schools and assisting them in developing their own technology integration practice focused on improving student learning. All schools will continue to utilize the assessment model developed in this project and include its results in their annual accountability reports.

Study Population and Context. Thirty-seven Tennessee public schools and the same number of control schools are involved in the study. Schools are drawn from qualified applicants for Tennessee's three consecutive competitive EdTech subgrant years, are located in geographically diverse environments (urban, suburban, and rural), and predominantly serve academically at-risk and disadvantaged students.

Objectives and Methodology. The project will measure effectiveness of the intervention in 37 schools; develop a replicable, validated evaluation protocol for use in all schools, and widely disseminate the results and instruments of this project. Both qualitative and quantitative measures will be examined to allow the development of accurate, reproducible protocols. A quasi-experimental approach will be used in year 1, and a true experimental approach involving the random selection of "treated" and control schools from a common pool will be undertaken for the years 2 and 3.

Analytical design: Both a longitudinal cohort analysis, using a two-level hierarchical linear model (HLM), and cross-sectional (full-school samples for each grade/year) analyses, using MANCOVA, will be conducted to assess program vs. control effects. Standardized outcome measures will be employed.

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[1] Leading All Users to New Challenging Heights
[2] Orchestrating Regional Bases Integrating Technology

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Introduction

The State of Tennessee Department of Education (SDE) has developed and implemented a number of educational interventions that incorporate technology applications to improve student outcomes, particularly in core academic areas. In the course of this process, it has become obvious that there need to be validated methods and procedures to measure the impact of these interventions on student performance. The focus of this proposal, therefore, is to improve the state's capacity to conduct a rigorous, scientifically based, high-quality evaluation of a systemic educational technology intervention by developing an evaluation protocol that meets these needs. The decision was made to evaluate an innovative professional development initiative since a high-quality teacher workforce, equipped to use technology in instruction, has been shown to be the key to success of any educational technology intervention. Information gathered and methodology developed in this project will be documented for wide dissemination, not only within the state, but nationally. The SDE, in conjunction with its partners, The Center for Research in Educational Policy (CREP) at The University of Memphis, the CNA Corporation (CNAC) and its Appalachian Technology Education Consortium (ATEC) program, and the State Education Technology Directors Association (SETDA), has the capability to undertake – and succeed in – such an effort.

The intervention that will serve as the subject of the evaluation is the professional development initiative entitled Tennessee EdTech LAUNCH (Leading All Users to New Challenging Heights) program (TnETL). TnETL's predecessor, Tennessee's Technology Literacy Challenge Fund (TLCF), was a program to prepare technology coaches in qualifying

schools to plan and implement a comprehensive professional development program tailored to meet the specific needs of the teachers in those schools. The primary goal of the coaches is to work with teachers to integrate student use of technology as a tool into curriculum and instruction to prepare students to meet state academic standards. Through TLCF, schools applied for a competitive grant and, with the assistance of a full-time technology coach, designed and implemented their own professional development program. Technology coaches from qualifying schools were provided training from SDE in conjunction with The University of Memphis (funded through ATEC).

The TnETL initiative builds on the TLCF model. In TnETL, schools apply and then are funded by the state from the competitive Title II Part D grant awards to provide professional development in their schools. The coaches work with teachers to train them in methods for aligning technology's use with the delivery of the curriculum using instructional materials that foster increased student achievement. In order to qualify, a school must not only dedicate some of its own resources to the program, but must make a commitment to continue the coaching and continually evaluate technology integration.

The TnETL program designed for Tennessee has three phases:

1. Year (Level) 1: Schools apply for state funds and inaugurate the program.

2. Year (Level) 2: A second cohort of schools enters the program.

3. Year (Level) 3: TnETL and previously funded TLCF schools may apply for designation as ORBIT schools ("Orchestrating Regional Bases Integrating Technology").

ORBIT schools are to be the major dissemination vehicle in the TnETL program within the state and provide professional development to teams of teachers from partner schools. The

ORBIT "reach" is not a train-the-trainer model since that diffusion method too frequently results in dilution. Instead, teacher-coaches from the ORBIT schools will mentor small teams within the satellite schools, assisting them in developing their own technology integration practice, focused on improving student learning. This team approach is appropriate in order to provide the satellite schools with a critical mass of trained teachers. The ORBIT model is expected to develop self-sustaining training sites, including support of the technology coach, through local support of professional development efforts, many of which are funded ultimately through various NCLB titles. After the research study, ORBIT centers will continue to utilize the assessment model developed in this project and include its results in their annual accountability reports.
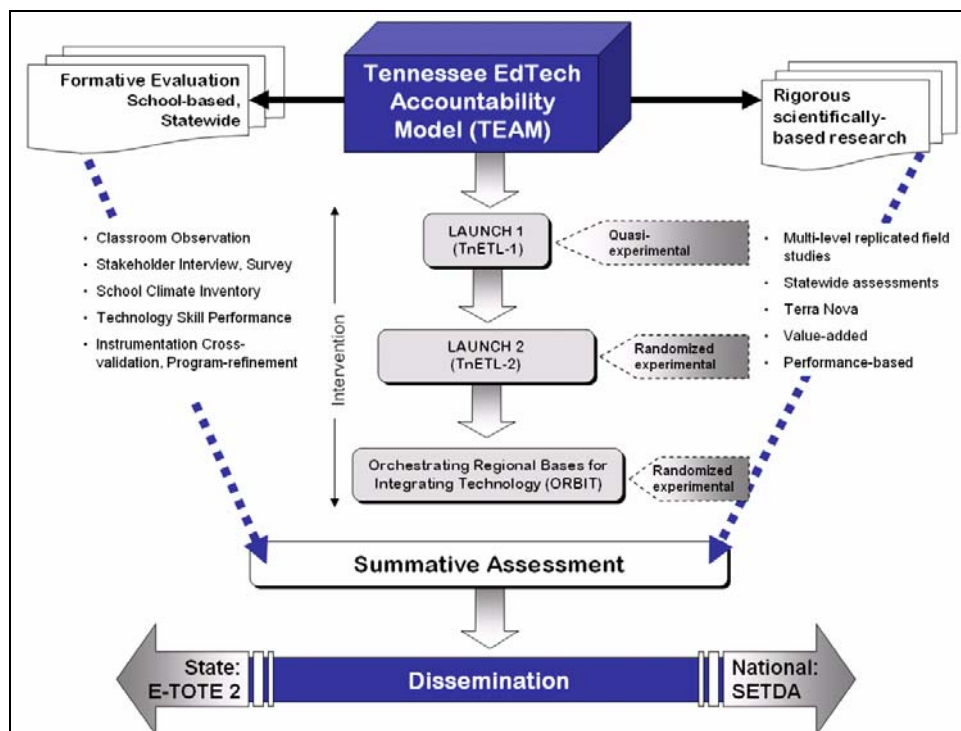
Figure 1: TEAM: Interventions, Research, and Dissemination

The development of the kind of evaluation envisioned by the U.S. Department of Education (USDOE) and the SDE requires testing and refining of methods, practices, analyses, and instruments used in the assessment of TnETL-ORBIT.

Both qualitative and quantitative measures will be examined to allow development of accurate, reproducible protocols. The evaluation effort will examine all three phases of the TnETL-ORBIT intervention about to be implemented in selected Tennessee schools as illustrated above in figure 1. A quasi-experimental approach will be used for the Level 1 program and will involve matching pairs of schools, with one of the pair receiving the intervention and the other serving as a control. This approach is necessary because the competitive awards for Level 1 have already been made. It is important to note that the plan for using matched controls in the external evaluation for these schools pre-dated the announcement of the USDOE competition. Should this proposal be funded, additional evaluation will be done on the matched control schools.

A true experimental approach involving the random selection of "treated" and control schools from a common pool will be undertaken for the TnETL – Level 2 program. ORBIT centers will also be evaluated using a true experimental design.

Technology coaches provide professional development and support teachers in the integration of educational technology into their instruction in a manner that fosters higher levels of student achievement and technological literacy for both teachers and students. Their effectiveness will be measured using the Formative Evaluation Process for School Improvement/ Tech Package (FEPSI/TP) evaluation instruments and process, shown in figure 1. An important feature of FEPSI/TP is that not only does it provide validated instruments to measure changes in school climate, instruction, and technology use, but it requires the school itself be an active

participant in the process. School administrators and teachers must develop their vision concerning the use of technology to foster learning, a plan to guide the implementation of the vision, develop benchmarks by which to measure progress, and engage in formative evaluation of their implementation process to drive continuous improvement. Changes in student outcomes will be measured using the results of the testing program mandated by the state, supplemented with two performance measures of problem-solving ability and of technology literacy.

Through analysis of the outcomes obtained by the FEPSI/TP process and the student achievement results from the TnETL and control schools, the benefits and challenges of the TnETL professional development initiative can be identified. The focus of this proposal, however, will be on the development, use, and refinement of what will be known as TEAM: the TN EdTech Accountability Model.

TEAM will consist of (a) the validated evaluation package (instruments and process); (b) the student outcome data on standardized state-mandated tests and student performance measures; (c) a web site of information concerning replicable methods, practices, analyses, and instruments for evaluation of educational technology use; and (d) a database that all schools can use to help develop and monitor their technology implementation plans. The database will be built on E-TOTE, an existing state database presently used by Tennessee for, among other things, tracking the state's educational technology infrastructure, support for educational technology at the school level, professional development in technology use, and the use of educational technology in instruction. The comparison of outcomes from Program ("treated") and control schools will determine effectiveness of the TnETL initiative.

Thus, with the development of TEAM, the project extends significantly beyond building capacity for the State of Tennessee to conduct a rigorous scientifically based evaluation of a

comprehensive, whole-school educational intervention that uses technology as a tool to enhance teaching and learning. The dissemination effort will make the products of the project available to both Tennessee educators and to districts and states nationwide, significantly expanding the capacity of SEAs and LEAs to evaluate specific intervention models and, for even greater functionality, to evaluate and compare two or more intervention models.

Significance

Almost 20 years ago, Alfred Bork presented his vision of the impact of personal computers on education:

> We stand at the beginning of a major revolution in the way people learn…We are moving rapidly toward a future when computers will comprise the dominant delivery system in education for almost all age levels and in most subject areas. Not since the invention of the printing press has a technological device borne such implications for the learning process (1985, p. 3).[3]

Judging by recent increases in computer acquisitions, at least part of Bork's prophesy seems close to realization in today's schools. There are significantly more computers in schools than there were a decade ago, and the proportion in classrooms, relative to computer laboratories, is also increasing. For example, in 1995, 84% of 7,000 fourth-grade students reported that they had computers in their classroom, and 79% had computer labs in their schools (Jerald and Orlofsky, 1999). The ratio of students to computers is also declining every year (Meyer, 2001). In 1992, there were 19.2 students per instructional computer, whereas in 2000, the ratio decreased to 4.0 per instructional computer. In Tennessee, according to the 2003 E-TOTE survey of all 1,657 Tennessee public schools, 76% of all classrooms had at least one internet-connected computer, while 69% of all schools surveyed had a computer lab. The survey further shows there were 3.9 students per instructional computer in Tennessee.

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[3] All citation references are provided in Appendix A

Realization of Bork's "revolution," however, requires developments beyond merely increasing the number of computers available to students. While implementation of an effective lesson can be hindered when computers are shared among five or more students (Hester, 2002), an important influence on teaching and learning is how computers are used in the classroom, regardless of the number of computers .   Windschitl and Sahl (2002) concluded from their study of classrooms in a laptop computer school, "the availability of technology was neither a necessary nor a sufficient condition to affect pedagogy" (p. 201). Although all students had their own computers, two of the three teachers observed failed to use the technology in ways that substantially changed or improved instruction. In a study in a middle-school context, Orrill (2001) found that even with extensive professional development and student access to technology, teachers struggled to use computers in enhancing student learning (also see Becker, Ravitz, and Wong, 1999).

While teacher skills in using technology are increasing (Pianfetti, 2001), recent findings indicate that nearly two-thirds of all teachers feel not at all or only somewhat prepared to use technology in their teaching (USDOE, 2000). In another study, two-thirds of the teachers reported that they never had used a computer prior to working in a school setting (Moe and Blodgett, 2000). The ability of teachers to use and be comfortable with incorporating technology into their classrooms gives this proposal its greatest significance. The importance of the TnETL initiative lies in whether this program can produce teachers with the ability to use technology effectively to support increased student achievement. Professional development that enables teachers to use technologies that will really support learning is more critical than choice of software.

Current federal policies and the State of Tennessee's *Enhancing Education Through Technology Plan* are directed toward addressing the challenges that have limited effective technology integration in many United States schools. Specifically, the No Child Left Behind (NCLB) Act of 2001 mandates active engagement by schools and districts in: (a) implementing proven strategies for integrating technology into curricula and instruction; (b) supporting high-quality professional development activities to facilitate such integration; and (c) examining the conditions under which technology is effective in increasing student achievement and teacher performance. At the state level, Tennessee's Strategic Plan to accomplish these goals, *Enhancing Education Through Technology*, has evolved over the past several years, and, as described in the following pages, has led to the present level of implementation and planned systemic scale-up of the TnETL model. This grant will fund the development, use, and refinement of TEAM as a protocol to evaluate TnETL as well as other technology interventions, responding to NCLB's requirement for greater accountability for student achievement and emphasis on what works.

Enhancing Education Through Technology: in Tennessee

The foundation for Tennessee's *Enhancing Education Through Technology* plan was established (contemporaneously with the enactment of NCLB) in 2001-02 with implementation of the final year of the Technology Literacy Challenge Fund (TLCF) program in the state. This evolving strategic plan draws from the TLCF, as well as the ongoing TnETL Program, in pursuing the following specific goals:

- **Goal 1**: All students will be educated in learning environments that have access to educational technology used in support of academic achievement.

- **Goal 2**: All students will demonstrate technology literacy by the end of eighth grade.

- **Goal 3**: All students will be taught by teachers qualified to use technology for instruction.

In its efforts to achieve these fundamental goals, the TEAM partners view the Evaluating State Educational Technology Program (ESETP) grant competition as an exceptional opportunity to forge an important strategy that will help shape its evaluation efforts using scientifically based methodology. Through TEAM, the Tennessee education system, from school level to state level, will increase its capacity to evaluate technology programs to determine needed improvements, both in the implementation and program design (formative evaluation) and in "what works" in the programs and in the evaluation (summative evaluation).

According to the intervention categories suggested in the ESETP RFP, the TnETL model and its sequel, ORBIT, most saliently address:

> (b) Professional development programs to enable teachers to integrate advanced technologies, including emerging technologies, into curriculum and instruction in order to prepare students to meet challenging State academic content and academic achievement standards. (Federal Register, 2003, p. 35127)

Additional categories that are relevant include:

> (e) Programs that use technology to help teachers meet the high standards of teacher quality defined in ESEA; and

> (f) Programs that use technology to meet the educational needs of children in rural areas.

Origin, Validation, and Components of TnETL

The framework for the evaluation that lies at the heart of this proposal is best understood through a description of the development and components of the TnETL intervention.

Origin of TnETL Model: TLCF design. TnETL was derived from a research and development program begun under Tennessee's TLCF project in 2001-02. The philosophy and rationale for Tennessee's final TLCF competitive grant program was based on several key assumptions:

- For technology to have an impact on student achievement, it must be integrated with the local curriculum and state content standards, not used as a stand-alone component or as the focus of instruction (i.e., learning *about* computers as opposed to learning *with* computers).

- Implementation will be weak and short-lived unless teachers are comfortable with technology integration, view it as supportive of their instructional goals, and possess the skills to employ it effectively. Thus, effectual, ongoing professional development is the foundation of successful integration.

- The availability of professional development must be timely and continual (Datnow, Hubbard, and Mehan, 2002; Desimone, 2002). Professional development disconnected from the classroom possesses limited transferability to actual needs, especially as school programs and curricula change. Professional development must also be provided each year and not just at the start of a new program. This latter requirement is particularly critical in high-poverty areas since schools that serve predominantly at-risk children may lose from 15-20% of their teachers every year (Ross, Stringfield, Sanders, and Wright, 2003).

These considerations led Tennessee to base its TLCF initiative on a "coaching" model in which highly trained "technology coaches" assist and train teachers at each of the 26 participating schools. To provide all new coaches with a common frame of reference, each coach received over 30 hours of training based on the iNtegrating Technology for inQuiry (NTeQ) system (Morrison and Lowther, 2002), which gives teachers a framework for developing problem-based lessons that use real-world resources, student collaboration, and the use of computer tools to reach solutions. The lessons using the NTeQ model are typically structured

around problems that engage students in critical examination of community and global issues while strengthening their research and computer skills.

Validation of TnETL Model: TLCF Evaluation/Accountability Model: Important to both the TLCF program and as a foundation for the proposed accountability model, the TLCF coaches served a leadership role at their schools in conducting formative evaluation on the progress of integration efforts using data that reflected systematic classroom observation, school climate, teacher attitudes and perceptions, principal support, and implementation benchmarks (Ross, Lowther, Walter, Mconald, and Wang, 2002). The same formative evaluation data were provided to the State of Tennessee in aggregate form (across TLCF schools) to support programmatic decision-making.

To the TLCF schools and their successors in TnETL, the current technology intervention is a whole-school improvement effort in which a home-grown technology coach provides tailored professional development to teachers in one-on-one and small group meetings, followed by classroom observations and ongoing tailored assistance designed to create self-sustained practice that integrates technology into everyday teaching and learning. The ultimate goal is to improve student learning.

The State Director of Instructional Technology emphasizes that the final TLCF intervention approach was undertaken in Tennessee because little systemic change appeared to have occurred from previous less-focused efforts. The external evaluation process for the TLCF pilot year was conducted without experimental or even quasi-experimental design because funding was beyond the capacity of the system. Nevertheless, the evaluators were charged with determining whether the coaching model in its individualized, personalized methodology was worth replicating. The decision to continue with a modification of the model was based on their

findings. The state realizes, however, that much greater validity in project evaluation is necessary and has already contracted for a quasi-experimental evaluation model using matched control schools for its first TnETL-1 competitive grant awards. In response to NCLB's focus on student achievement, the evaluation plan already crafted for TnETL-1 includes referencing student performance scores from the state's annual administration of Terra Nova tests in grades three through eight as well as its annual writing tests. This demonstrates the commitment of state-level directors to continuous improvement and to making decisions based on data derived from formative evaluation. Based on this pattern of behavior, it is reasonable to expect that the formative knowledge generated by this new study will also be used to inform practice and guide subsequent behaviors. In fact, the SDE is committed to making the evaluation model, to be developed in collaboration with the USDOE, a core component in its strategies for ensuring the effective use of technology in everyday teaching and learning.

Validation of TnETL Model: TLCF Evaluation outcomes. In general, the TLCF evaluation indicated that in only one year participating schools made substantial progress in implementing the four TLCF benchmarks involving quality teacher training and support, access to multimedia computers in classrooms, classroom connectivity to the internet, and integration of effective software and online learning resources with curricula.

School-level results from the TCLF project showed the expected variability in quality of implementation, with some schools that developed exemplary programs involving virtually all teachers in meaningful technology integration while others addressed the logistical and operational requirements of establishing connectivity and allocating computer resources. Across all schools - even the slower starters - there was remarkably strong agreement by both teachers and principals that the coaches were performing critical and useful functions for advancing

technology usage within the school. Pre- and post-program classroom observations showed significant progression in teaching methodology toward student-centered methods (i.e., greater usage of project-based learning, independent inquiry, technology as a learning tool, cooperative learning, and student discussion). Importantly, student attention/interest also increased during the course of the year. Advancements in technology applications were reflected in significant increases from Fall to Spring assessments in individual student use of computers, student computer skills, use of presentation software, use of the Internet, teacher attitudes toward and skills in using technology, and "meaningful" integration of technology.

    Components of TnETL model. Schools knew at the outset that TLCF funding would end after only one year. Thus, although anecdotal evidence suggested that formative data were being used at many schools to guide future strategies, the consistency and depth of such activities remained uncertain because the program evaluation did not extend beyond the contractual period.

    At the state level, however, both the aggregate formative evaluation data and the research study results were directly employed to guide improvements in the next phase of promoting state-wide technology integration efforts. Specifically, it was decided to (a) initiate programs in the Spring to permit coach training and equipment purchase prior to the start of the school year; (b) establish a half-time computer technician at each school to reduce the coaches' technical responsibilities; (c) employ successful TLCF schools as mentor schools for the new TnETL schools; and (d) require the EdTech schools to self-fund coach positions beyond the grant period.

    Application of these refinements was reflected in the design and implementation of the federally funded TnETL project. The first (2003-04, TnETL-1) and second (2004-05, TnETL-2) "launches" (along with the original TLCF schools) will establish school cohorts that have the

potential to become Technology ORBIT centers throughout the state. Through an orbited

diffusion structure, a systemic professional development and technology integration support

system will be developed to serve increasing numbers of teacher teams in Tennessee schools.

The ORBIT centers will be funded with the third year of EdTech competitive funds. The

centers will use the technology integration experience of teachers (and coaches), trained through

the TLCF and TnETL programs, to work directly with teacher teams in schools not served by the

previous rounds of EdTech grants. School teams, rather than individual teachers, are desirable in

order to provide in-house, ongoing support for the expansion of technology incorporation. The

ORBIT concept is a regional model that belongs to a consortium of local school districts within

reach of the center. The center itself will have a physical location, within an existing TLCF or

TnETL school, but its services may expand to include on-line learning opportunities for teachers.

The capacity for on-line learning opportunities is currently being developed using EdTech

Leaders Online and an EdTech GEAR (Generating Equal Access for Remote areas) scholarship

grant that develops a cadre of course facilitators to provide on-line workshops for educators.

When Tennessee's program matures to the ORBIT stage, it will employ the evaluation model

refined and tested under the ESETP grant. Thus, the research proposed here will become part of

an ongoing program.

In the final ORBIT phase, schools with teachers and coaches whose experience was

crafted through TLCF, TnETL-1, or TnETL-2 will become teaching centers whose mission it is

to reach small teams of teachers in other schools. Teacher mentors will provide ongoing,

individualized support to small "satellite" teams within other schools and assist them in

developing their own technology integration practice focused on improving student learning.

The ORBIT model is expected to become self-sustaining through locally funded support in ways

that provide both form and substance to local professional development efforts, many of which are funded ultimately through various NCLB titles. The successful school-based satellite teams will serve as catalysts to inspire new teams to apply to the ORBIT academies. After the research study, ORBIT academies will continue to utilize the validated assessment model and include its results in their annual accountability reports.

Thus, the evaluation plan proposed by Tennessee's ESETP application can be reasonably expected to produce outcomes, products, and publications that will inform the field about evaluation practice because it undertakes the complex challenge of examining the collective effectiveness of school climate, teacher practice, and student results by using formative as well as summative assessment techniques in a consistent and replicable manner. The project develops (1) an accountability model based on the use of validated formative and summative evaluation instruments that will be refined and cross-validated; (2) descriptive formative documentation that will be published on a quarterly basis; and (3) a report of research findings that will be published as the concluding document. Its more living outcome will be a state where educators have available and actually use reliable evaluation tools for the continual assessment of their pedagogical practices.

Disaggregaiton of Evaluation of Results. The composition of study subjects was designed in TnETLL-1 to ensure proportionate representation of rurally isolated subgroups. Given the random selection of subjects for year 2 and year 3 of the study, the population can be expected to represent all subgroups of students.

Tennessee's statewide accountability model disaggregates student achievement data to meet the new requirements of NCLB that will take effect in SY 2003-04. Therefore, all

evaluation results from the TnETL and ORBIT subjects can and will be disaggregated as requested in the ESETP RFA by ethnic/language minorities, rural isolation, and poverty.

The TEAM model as delineated in this proposal generates energy in three complementary directions. Through this project, the USDOE – and all of its constituents – receive high-quality, scientifically based research which will inform the field about evaluation practice. The Tennessee schools engaged in the study employ formative evaluation methods which will be easily exportable to different settings. And the state will aggressively pursue having the tested model which generates ongoing formative evaluative data become part of the standard practice in the state.

USDOE receives high quality research

Tennessee EdTech Accountability Model (TEAM)

School uses formative evaluation methods

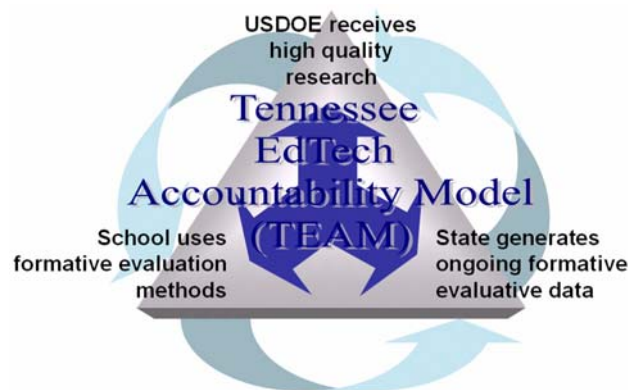State generates ongoing formative evaluative data

Figure 2

Conclusion

Through the design presented in these pages, it will be shown that Tennessee's proposed ESETP project is strategically poised to focus on what works by creating and/or validating the tools and processes leading to an accountability model that provides a consistent lens for determining what works in fostering effective technology integration leading to increased student outcomes and technological literacy. The project does continue existing efforts, incorporating the formative evaluation approach initiated in TLCF and improved in TnETL-1 as an ongoing school-level process. Tennessee's ESETP proposal makes an explicit step toward embracing the

connection between effective technology integration and accountability for student achievement by making student achievement scores a core component of the evaluation plan. Results from the TEAM project will provide a protocol for use in assessing the effectiveness of educational technology interventions targeted toward raising student achievement in both structured contexts, in which teacher and school participation is part of a formal project (e.g., TnETL-1, TnETL-2), and as part of a systemic scale-up, in which schools and teachers participate more autonomously to meet NCLB and state requirements (Technology ORBIT Centers).

The project will also result in the extension and refinement of Tennessee's educational technology database, E-TOTE, through incorporation of FEPSI/TP and student outcomes data and the development of a complementary set of analysis and decision-support tools that will enable users to identify the contribution made by the various components of intervention programs and other school variables to the successful integration of technology in the classroom and increased student outcomes. This information can be used in guiding the implementation of effective technology integration plans and the concomitant task of allocating resources for them.

The E-TOTE database reports, available on the web, will provide to parents important information about the schools their children attend, thereby supporting enhanced parental choice.

The greatest significance of the proposed project, however, lies in its overarching goal of crafting a rigorous, scientifically based evaluation protocol that can be replicated to assess a wide variety of technology related interventions, particularly as they affect student outcomes. Designing interventions is not hard, judging by the number both proposed and being implemented. The difficulty for individual schools and districts comes in implementing interventions that have the greatest chance for success in improving student outcomes in a given environment in order to accomplish the goals of NCLB. TEAM will bridge this gap by

providing a comprehensive picture of implementation practices and outcomes to guide and refine

the educational use of technology, thus ensuring positive impacts on student learning and

achievement.

Project Design

TEAM is designed to both extend and enhance the Tennessee's TLCF and TnETL initiatives by developing a sustainable state-wide technology evaluation system. The study will have three phases or iterations designed for the three progressive levels of the TnETL-ORBIT intervention. The project design has five components:

1. A rigorous set of replicated research studies.

2. Assessment of the performance measures and evaluation tools.

3. Evaluation and extension of the existing E-TOTE on-line data collection process.

4. Dissemination of process and product.

5. Incorporation of school-level formative evaluation.

The principal investigator for the study is Steven M. Ross, Center for Research in Education Policy (CREP), The University of Memphis, TN. CNAC will provide critical research support, and SETDA will be a technical assistance partner. The SDE will be at the operational center of the program. Figure 3 illustrates the collaboration lines in terms of the five components of the project design.
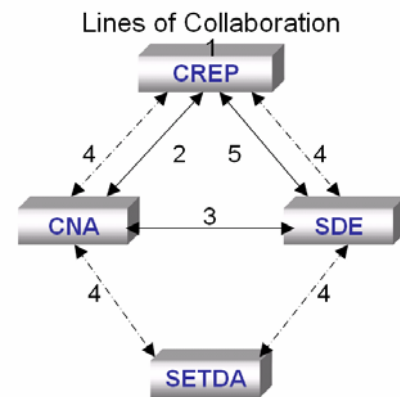

Figure 3

To discuss the project design, this proposal will first describe the five components listed above, then delineate the methodology proposed to address each of the goals described by the ESETP RFA. The study is designed to evaluate the three-year program funded by competitive grants issued by the state under Title II, Part D.

Project Design: Five Components

Five components are woven into the fabric of the project. The first and primary component of the TEAM project is the research study itself, while the other components strengthen the infrastructure needed to support the study and establish the internal and external extensions or dissemination patterns.

Project Design Components	GOALS		
	1: Develop evaluation plan	2: Test impact	3: Dissemination
1. Research studies: CREP	X	X	X
2. Psychometric validation: CNA/CREP	X	X	
3. Data-driven formative evaluation: CNA/SDE		X	X
4. Ongoing dissemination: CNA/CREP/SETDA/SDE		X	X
5. Scale-up: SDE/CREP		X	X

Table 1: Goal and Component Intersections

<u>**COMPONENT 1**</u>**: *Replicated research studies*.** As the lead partner, CREP will undertake a rigorous set of replicated research studies to assess the effectiveness of the three progressive levels of the Tennessee interventions on student achievement and technology usage. The interventions will progress from TnETL-1, through TnETL-2, and culminate with the ORBIT Centers, the model designed for scaling-up technology integration in Tennessee schools. Within the context of this study, ORBIT represents a significant, structured internal dissemination strategy to support continuation of scientifically based evaluation beyond the period of federal financial assistance. Both the ORBIT Centers and their satellites will continue to perform formative and summative evaluations as developed and validated through this program.

Table 2: Component 1

COMPONENT 1 Schematic

	Level 1	Level 2	Level 3
Subjects	13 TnETL-1 schools and 13 matched controls	10-12 TnETL-2 schools and 10-12 control schools randomly assigned from qualified applicants for TnETL-2	12 individual school teacher teams randomly selected and coached through regional ORBIT centers and 12 control teams
Design	Matched treatment-control group; quasi-experimental	Randomized field studies	
Mixed Methods Design: measures of	Implementation, school climate, teacher and technology coach experiences, student achievement on standardized tests and two performance measures of technology application to problem solving		
Results	Identify forms of effective technology integration strategies that raise student achievement in structured contexts where school participation is part of a formal project		Systemic scale-up (increased autonomy)

COMPONENT 2: *Assessment of performance measures and evaluation tools.* CNAC, in tandem with CREP, will (a) assess the psychometric properties and utility of the FEPSI/TP performance measures and evaluation tools and selected parallel instruments developed by SETDA Common Data Elements Task Force and (b) determine whether they are linked to changes in multiple achievement measures used in Tennessee (TCAP raw scores, TVAAS value-added scores, TCAP writing assessment). An additional element in component 2 will be yearly formative evaluation of measures by examining instrument costs, logistical requirements, and user reactions.

COMPONENT 3: Evaluation and extension of E-TOTE. The third component will extend and evaluate Tennessee's new and evolving E-TOTE, an online data collection process. E-TOTE will include (a) accumulating state-wide data on TnETL applications including school demographics,

climate, implementation data, and achievement outcomes; (b) supporting state-level research on program effectiveness, best practices, and the characteristics of successful schools through a structured query process; (c) facilitating individual schools' involvement in formative evaluation; and (d) providing an adaptive automated information system to school- and state-level decision making on technology integration strategies and needs assessment.

**COMPONENT 4: Dissemination.** The study will incorporate a state-wide and national dissemination system that uses

> (a) a regularly updated project web site to publicize project expectations and progress, provide access to evolving instruments, and offer insight into the formative changes instituted throughout the project duration;
>
> (b) extension of the current E-TOTE system to collect data and feed reports that communicate findings from TEAM dynamically; and
>
> (c) local, state-level, and regional conference presentations

This latter dissemination method is deemed particularly important in Tennessee because many recipients of federal funds do not know how to effectively assess the impact of technology on student learning. The grant, therefore, offers great promise for addressing what is a pressing need within the state.

Tennessee's proposal includes participating in SETDA's Technical Assistance Partnership Project (TAPP) in the dissemination effort to contribute to the inherent value of having the project process, progress, and products available to the larger community in the common format proposed by SETDA as a technical assistance component for other ESETP grant participants. TAPP emphasizes the power of collaboration through informing the evaluation process and increasing the impact of the grants through dissemination. Consistent with the intent

of the grant notice, TAPP also seeks to bring grantees together as they progress through the evaluation process and allow grantees to share their lessons learned, recommendations, approaches, methodologies, and tools with other states, districts, schools, and organizations. SETDA's TAPP will profile the TEAM model in a comprehensive, scientifically based research handbook that includes relevant information about the evaluation plan, its implementation, and results. Through alliance with SETDA, the TEAM research will be presented in a speakers' circuit, virtual rountables, and newsletters. The state will distribute the handbook (on CD or on paper) to school districts in a professional development setting, with particular attention to schools involved in federal programs.

COMPONENT 5: _Incorporation of school-level formative evaluation._ The state, in collaboration with CREP, will make school-level formative evaluation a formal component of TEAM to benefit schools as they develop and maintain their own professional development plans for technology incorporation. Starting with the Level 1 TnETL implementation and continuing through and past the ORBIT implementation, each Tennessee school participating in TnETL will be required to engage in site-based formative evaluation using the FEPSI-TP sets of instruments. The benefit will be seen in schools developing ownership of their technology integration efforts, while also building accountability to the state using common data points that address national technology standards.

Incorporating TEAM into all three years of TnETL will provide a solid base for all local- and state-supported technology integration professional development efforts. Providing the structure of the TEAM accountability model will develop a scientific basis for state efforts and offer a viable methodology to others seeking a scientifically researched professional development assessment model.

Project Design: Methodology by Goal

The methods employed by the Tennessee ESETP project are presented here organized by the

three goals delineated in the ESETP RFA.

METHODOLOGY FOR GOAL 1:

> GOAL 1: Develop a plan to conduct a scientifically based evaluation of an educational intervention that uses technology applications as a tool to increase student achievement in one or more core academic subjects.

Over the three-year grant period, the project will examine the effectiveness of the

TnETL model for integrating technology to improve teaching and learning in Program schools,

i.e., schools receiving the "treatment." The major research questions to be addressed are:

1. Does implementation of the TnETL model raise student achievement in Program schools

    compared to control schools?

2. (a) Does implementation of TnETL improve teachers' skill levels in, and attitudes

    toward, integrating technology with curriculum and state standards?

    (b) To what degree do teachers at Program and Control schools specifically demonstrate

    competency in the National Education Technology Standards (NETS) for Teachers?

3. Does TnETL foster greater use of research-based teaching practices that address state

    content standards while increasing academically focused instructional time and student

    attention and engagement?

4. (a) Does TnETL improve students' skill levels in, and attitudes toward, using technology

    as a tool for enhancing learning?

    (b) To what degree do students at Program and control schools specifically demonstrate

    competency in the NETS for Students?

5. What is the impact of TnETL implementation on school-wide improvement in organization and school climate?

6. What school variables (e.g., poverty level, location, size, and school climate) are associated with effective TnETL implementation and improved student achievement?

7. What program variables (e.g., full TnETL model, ORBIT Center Model) are associated with effective program implementation and improved student achievement?

RESEARCH DESIGN for GOAL 1:

Randomized field experiments currently provide the most powerful means to measure program effects (Shavelson and Towne, 2002; Slavin, 2002). With TnETL, random assignment of schools to treatment and control conditions would eliminate selection bias—the likelihood that schools that pursue program participation differ in characteristics (e.g., have more motivated teaching staff, stronger principal leadership, greater interest in school reform) from those who choose not to participate. Given the complexity of evaluating programs in actual school environments, the research approach should employ not only randomized field experiments, but should also incorporate qualitative data to enhance understanding of the contextual factors influencing student achievement (Berends et al., 2001; Datnow et al., 2002.). However, despite the advantages of randomized experimental designs over quasi-experiments for increasing internal validity, there may be instances where schools' or teachers' awareness of being assigned to "control" or "treatment" conditions influences their behavior in unnatural ways (i.e., the Hawthorne and "John Henry" effects). To determine the generalizability of program effects with different types of internal validity threats controlled (e.g., differential sampling vs. diffusion of treatments), there are advantages to replicating investigations of the same phenomena using randomized field trials and rigorous quasi-experiments (Ross, 2003).

The proposed evaluation will address the foregoing research questions and rationale using a <u>multi-level replicated design</u>. As described below, the effects of the TnETL model will be examined using mixed-methods designs (Onwuegbuzie and Teddlie, 2003), beginning with a matched-treatment control, quasi-experiment (Level 1, 2003-04) and transitioning in Levels 2 (2004-05) and 3 (2005-06) to randomized field experiments. The successive research levels directly correspond to the implementation of different phases or modes of the TnETL model: Level 1, Level 2, and Technology ORBIT Center schools.

Level 1, 2 and 3 Studies (TnETL-1, TnETL-2, ORBIT)				
Program	**Year**	**2003-04**	**2004-05**	**2005-06**
TnETL-1		Level 1: Matched Control		
TnETL-2			Level 2: Random	
ORBIT				Level 3: Random

Table 3: ESETP Grant period and NCLB Title II Part D Funding

TEAM provides high-quality, rigorous research of different iterations ("levels") of the TnETL intervention: TnETL-1, TnETL-2, and ORBIT.

LEVEL 1 STUDY: LAUNCH I (TNETL-1)

Overall Level 1 Design

The Level 1 study will be performed in conjunction with, and substantially expand, the State of Tennessee's already planned formative and summative investigation of TnETL-1. In this phase of the program, 13 "Program" schools have already been selected to participate, precluding random assignment of schools to treatment.

A matched treatment-control group quasi-experimental study will be employed for the Level 1 research, followed by randomized field studies for Levels 2 and 3. Mixed-methods designs will include measures of implementation, school climate, teacher and technology coach

experiences, and student achievement on standardized tests (including value-added scores), and on two performance measures of technology applications to problem-solving.

The mixed methods design that will be employed incorporates multiple qualitative and quantitative descriptive assessments at Program schools and a quasi-experimental matched-treatment control school design to assess program effects on student achievement and technology integration outcomes. One matched control school will be selected for each of the 13 Program schools. Criteria for matching will include:

<u>Student Achievement</u>

- Tennessee Comprehensive Assessment Program (TCAP) test scores in language, reading, and mathematics in 2002

<u>Student Demographics</u>

- the percent of minority students enrolled for 2000-02

- the percent of non-minority students enrolled for 2000-02

- the percent of economically disadvantaged students enrolled for 2000-02

- the percent of mobile students as determined from 2000-02 cumulative attendance

<u>School Characteristics</u>

- School location (rural, suburban, small cities)

- Grades served

- School size

Level 1-a: Qualitative and Descriptive Study

The full instrument set from the FEPSI/TP will be administered for each TnETL school. FEPSI is a research-based package of evaluation tools designed to raise student achievement by

involving schools in improvement processes strongly associated in the educational literature with improved learning:

(a) teaching methods that increase student engagement and instructional time;

(b) positive school climate;

(c) strong teacher support and buy-in; and

(d) full implementation of programs and alignment with state standards.

In 2002-2003, FEPSI instruments were used in over 2,000 schools across the nation, with systemic adoptions of full FEPSI including the State of Georgia for all Comprehensive School Reform (CSR) sites, the State of Tennessee for all CSR and Reading Excellence Act (REA) schools, Pulaski County (Little Rock) School District, and Decatur, IL. In summer, 2002, FEPSI was audited in a systematic study by SERVE and judged to be grounded on sound research-based principles for school improvement. Validation and descriptive information on each instrument, along with their alignment to the NETS standards for Teachers and Students and National Curriculum Standards in language arts, mathematics, science, and social studies, can be found at http://www.memphis.edu/crep.

FEPSI/TP consists of six core instruments of School Observation Measure (SOM) (Ross, Smith, Alberg, and Lowther, in press); School Climate Inventory (SCI) (Butler and Alberg, 1991); principal interview, teacher focus groups, implementation benchmarking (Ross and Alberg, 2002), and Rubric for Student-Centered Activity (Lowther and Ross, 2002a), supplemented by four technology-specific measures—Survey for Computer Use (Lowther and Ross, 1999), Technology Teacher Questionnaire (TTQ) (Lowther and Ross, 2002b), Technology Coach Survey (Lowther and Ross, 2002c), and Technology Coach Interview.

Data collection at the school level will consist of:

- Faculty surveys (all teachers at spring faculty meeting: TTQ and SCI, 45 minutes)

- Teacher focus group (approximately 10 randomly-selected teachers in spring, 1 hour; Program group only)

- Principal interview (spring, 1-2 hours, Program group only)

- Technology coach interview and survey (spring, Program group only)

- Observations (five 3-hour whole-school visits and five 1-hour targeted visits to observe technology lessons), fall and spring: SOM, Survey for Computer Use, Rubric for Student-Centered Activity)

- Implementation benchmarks (by November 1: Program group only)

Analyses.

Quantitative data (e.g., school climate and technology surveys and observations) will be analyzed for each TnETL and Control school. The questionnaire and observations will be reported descriptively using means, frequencies, and percentages. Where comparative teacher-level or school-level quantitative data are obtained (observations and school climate), MANOVA and linear regression analyses will be used to determine program effects (also see student achievement study, below).

Qualitative data (open-ended items and interviews) will be examined using a content analysis similar to the analytic procedures developed by Glaser and Strauss (1967) and Strauss and Corbin (1998). In this procedure, the comments and interviews are transcribed and then excerpted into meaningful units. Open coding is then employed, which allows for the division of the data into parts through an unrestricted inquiry process. In this process, each excerpt is examined and then assigned one or more codes that represent both the latent and manifest meaning contained in the excerpt. After all of the excerpts are coded, the codes are then

compared and similar codes are clustered into categories. The categories are assessed according to the extent to which the data interrelate (internal homogeneity) and also the extent to which the categories are mutually exclusive (external heterogeneity). The categories are then assessed and used to examine the respondents' experiences.

Level 1-b: Student Achievement Study

Standardized achievement measures.

The state-mandated standardized test employed for TCAP is the TerraNova or CTBS-5 (CTB/MacMillan/McGraw Hill, 1997), administered in Grades 3-8. The TCAP yields conventional percentile scores for students as well as Tennessee Value-Added Assessment (TVAAS) scores. The latter "value-added" scores are computed from mixed model analyses of the TerraNova data to indicate degree of student gain in each subject from one year to the next (Sanders and Horn, 1995a, 1995b). Thus, schools serving differing socio-economic status levels can be fairly compared on the basis of the level of gain achieved. The TCAP also includes an open-ended writing assessment, directed by prompts, in Grades 5 and 8. The students' writing samples are scored by trained judges on a six-point rubric.

Performance assessments.

Standardized tests have high reliability and credibility for program evaluation. However, such test scores address only certain aspects of what students know and are able to do (Pellegrino, Chudowsky, and Glaser, 2001). This view is reinforced by John Bailey, Director, Office of Educational Technology, USDOE, at a recent conference on assessment issues involving technology:

> I'm sensing, at least from both federal and state policymakers, a real hunger for new alternatives and new ways of assessing students. I have not met a single politician or public policymaker who is pleased with the full range of standardized tests [available to

them] today. They all recognize that these are very blunt tools. (In Axelson, McGraw, and McEntee, 2002, p. 7).

To supplement the state-mandated measures with open-ended assessments of knowledge synthesis and application, the project will employ two associated performance assessments. The first is a Problem-Solving Analysis, developed and employed by Lowther, Ross, and Morrison (in press) in a study of high vs. low classroom computer access. Written solutions by individual students to a prompted problem task are assessed using a rubric comprised of seven components x three performance levels (1=low, 2=moderate, 3=high). The components are: 1) understands problem, 2) identifies what is known, 3) identifies what needs to be known, 4) determines data manipulation, 5) describes use of technology, 6) describes how to present findings, and 7) collaborative learning. The present problem task was developed to assess content and skills stated in the National and Tennessee Curriculum Standards. An additional measure, the Technology Application Task, will be designed for this project to use in conjunction with the Problem-Solving Analysis. It will specifically address the NETS for Students by asking students to *demonstrate* task-relevant technology applications as part of the problem-solving work product. Exemplary applications would encompass using a spreadsheet, constructing graphics and visual displays, analyzing data, etc. A rubric will be developed to assess the appropriateness, depth, and quality of the technology applications.

Analytical design.

Both a longitudinal cohort analysis, using a two-level hierarchical linear model (HLM), and cross-sectional (full-school samples for each grade/year) analyses, using MANCOVA, will be conducted to assess program (TnETL) vs. control effects. Standardized outcome measures will consist of the TCAP assessment in reading, language, mathematics, social studies, and

science in Grades 3-8; and in writing in Grades 5 and 8, spanning pre-program (2002-03) and post-program (2003-06) years.

In the Level 1 (within schools) analyses, student-level post-test scores will be regressed on pre-test scores for school, with the pre-test variable centered on the grand pre-test mean for all schools. These analyses will yield two outcome variables for each school: (a) an adjusted post-test mean, and (b) a pre-test/post-test regression slope. The Level-2 (between schools) analyses will employ three school-level variables to estimate program effects on adjusted means and pre-test/post-test slopes: (a) percentage of students receiving free- or reduced-price lunch, (b) TnETL program, and (c) control program. Coefficients estimated for TnETL and control programs will represent the difference between the average adjusted means (or slopes) for schools implementing these programs and the expected adjusted mean given the level of poverty in the school. Thus, inferential statistical tests on the effectiveness of these two programs will control for both differences in average pre-test scores and differences in school-level poverty rates. An effect size estimate will be computed for each program for each year and grade level by dividing the coefficient associated with the program derived from the HLM by the pooled within-schools standard deviation of the post-test in the baseline year (2002-03). The effect size estimate (*ES*) represents the difference between the actual and expected adjusted means for a program in standard deviation units, or *z*-scores.

For assessment purposes, Tennessee is unique in having a fully-developed value-added assessment system (TVAAS) that yields "gain" scores for each school (Sanders and Horn, 1995a, 1995b). Such scores have already been employed in several high-quality program evaluations to provide perspectives different from those that derive from analyzing standard percentile or NCE scores. For example, in evaluating the Memphis City Schools Restructuring

Initiative from 1997-2000, Ross, Sanders et al. (2000) found that, although differences between

CSR and control schools on percentile scores were small and nonsignificant, the original cohort

of CSR schools demonstrated large and significant effect sizes on TVAAS scores in years 2-4 of

restructuring.

Procedure.

A timeline for data collection is provided with associated research questions and

instruments in Table 4.

Table 4. Evaluation Questions by Instrument

Evaluation Questions	Instruments
1. Does implementation of the TnETL model raise student achievement in Program schools compared to Control schools?	- TCAP-achievement (language, reading, science, social studies); GR 3-8 - TVASS (value-added in same subjects and grades) - Writing assessment; GR 5 and 8 - Technology Application Task: GR 4-5 - Problem-Solving Analysis: GR 4-5 (All Spring administrations)
2. (a) Does implementation of TnETL improve teachers' skill levels in, and attitudes toward, integrating technology with curriculum and state standards? (b) To what degree do teachers at Program and Control schools specifically demonstrate competency in the NETS for Teachers?	- SOM (5 fall and 5 spring) - SCU (5 fall and 5 spring) - RSCA (5 fall and 5 spring) - Teacher Technology Questionnaire (Spring - Teacher Focus Group (Spring) - Coach Survey (Spring)
3. Does TnETL foster greater use of research-based teaching practices that address state content standards while increasing academically focused instructional time and student attention and engagement?	- SOM (5 fall and 5 spring) - SCU (5 fall and 5 spring) - RSCA (5 fall and 5 spring) - Teacher Technology Questionnaire (Spring - Teacher Focus Group (Spring) - Coach Survey (Spring) - Implementation Benchmarking (fall and spring)

Evaluation Questions	Instruments
4. (a) Does TnETL improve students' skill levels in, and attitudes toward, using technology as a tool for enhancing learning? (b) To what degree do students at Program and Control schools specifically demonstrate competency in the NETS for Students?	▪ SOM (5 fall and 5spring) ▪ SCU (5 fall and 5spring) ▪ RSCA (5 fall and 5 spring) ▪ Teacher Technology Questionnaire (Spring ▪ Teacher Focus Group (Spring) ▪ Coach Survey (Spring) ▪ Student focus groups ▪ Implementation Benchmarking (fall and spring)
5. What is the impact of TnETL implementation on school-wide improvement in organization and school climate?	▪ SCI (Spring) ▪ Teacher Focus Group (Spring) ▪ Coach Survey (Spring) ▪ Student focus groups ▪ Implementation Benchmarking (fall and spring)
6. What school variables (e.g., poverty level, location, size, and school climate) are associated with effective TnETL implementation and improved student achievement?	▪ All instruments
7. What program variables (e.g., full TnETL model, ORBIT Center Model) are associated with effective program implementation and improved student achievement?	▪ All instruments

LEVEL 2 STUDY

Overall Level 2 Design

The Level 2 study will replicate and extend the Level 1 research by evaluating the

progress of 10 to 12 Tennessee TnETL-2 schools, using a true experiment, specifically, a

matched-pair/treatment-control group design in which schools carefully matched by a variety of

criteria are randomly assigned to Program (TnETL-2) and control groups. To implement this

design, the State will issue a statewide invitation for schools to participate in TnETL-2. The

announcement will specify and require applicant schools to acknowledge that due to space

limitations and research/accountability requirements, the 10-12 slots available for TnETL-2 will be filled via random selection from the pool of schools whose applications are accepted. Schools not randomly selected from the pool will be expected to participate as control schools. Incentives for control schools will include receiving formative and summative data at no charge, an annual financial stipend for purchasing software or other technology resources, and priority to participate in the Technology ORBIT Center program (see Level 3) following project completion.

Schools accepted for the sampling pool will first be grouped by (a) any model or special program also being used (e.g., Tennessee Reading First, Success for All, Modern Red Schoolhouse, etc.); (b) grade levels served; and (c) location (urban, rural, suburban). From this frame, a cohort of "matched" pairs will be constructed, so that the remaining sampling cohort will consist of pairs of schools matched on model/program, grade level, and location. Each pair in this cohort will then be examined to ensure that they are further matched by: (a) student SES (percent receiving free-reduced lunch); (b) student ethnicity; (c) student mobility; (d) whole-school prior achievement; and (e) school size. From this analysis, a reduced sampling pool of highly comparable matched pairs will be derived. The 13 matched pairs will be selected to yield a final sample of the same number of TnETL schools and controls. Random selection will determine program assignment within each pair. If either member declines to participate, replacement of any school pairs will be made from the remaining sampling pool to maintain the target sample size of 13 matched pairs.

Study Methodology.

The procedure, instrumentation, and analyses described for the Level 1 study will be replicated. However, formative evaluation of the accountability model (see TEAM Goal 2) will

most likely result in refinements of different aspects of the research to increase validity and practicality. Main components of the Level 2 research will consist of the qualitative/descriptive study, the student achievement analysis to include both state-mandated and performance assessments, and the path analysis to relate school demographic, climate, and implementation variables to student outcomes.

LEVEL 3 STUDY

Overall Level 3 Design.

The Level 3 study will replicate and extend the prior research by evaluating the progress of 10 Technology ORBIT Center schools. Importantly, with regard to scale-up of the TnETL intervention, Level 3 will involve more limited external funding to schools, while directing the locus of professional development and guidance to the regional ORBIT Centers. As in Level 2, a matched-pair/treatment-control group design will be employed. Sample selection will again be driven by (a) a state-wide invitation for schools to participate in the ORBIT Center program by involving teacher teams in training and mentoring from the centers; (b) prior agreement by each applicant school to serving as a randomly selected Program or control school; (c) stratification and matching of approved applicant schools based on demographics; and (d) random assignment to treatment matched-pair members, with replacements, if necessary, to yield the target sample size of 12 matched pairs.

Study Methodology.

The procedure, instrumentation, and analyses described for the Level 1 and 2 studies will again be replicated, following refinements based on the formative evaluation (see TEAM Goal 2). Main components of the Level 3 research will therefore consist of the qualitative/descriptive study, the student achievement analysis to include both state-mandated and performance

assessments, and the path analysis to relate school demographic, climate, and implementation variables to student outcomes.

METHODOLOGY FOR GOAL 2:

> Goal 2: Conduct the evaluation in a manner that tests the impact of the intervention as well as the efficacy of the empirical methods, practices, and instruments used to assess the impact of the intervention on student achievement.

The implementation of TEAM will provide an important opportunity to validate and refine the accountability system and instrumentation, as well as to assess the impact of the TnETL intervention. Although the FEPSI-TP instrumentation has been linked to national technology and content standards, subjected to reliability and psychometric validation (e.g., Sterbinsky and Ross, 2003), and employed in a growing number of peer-reviewed, published studies (e.g., Smith et al., 1998; Ross and Lowther, 2002; Lowther et al., in press), cross-validation with similar instruments to ascertain concurrent and construct validity has not been conducted. The recent development by SETDA of a set of technology-oriented data collection tools offers the opportunity to compare similar tools in the two packages as a basis for the validation and refinement of each.

The cross-validation test will begin with the CNAC research partner preparing a cross-walk between the FEPSI/TP instrumentation and the SETDA data collection tools. Several sets of items from the SETDA tools that appear to collect the same information as the matching sets in FEPSI/TP will be selected. Matched sets of items will be used in school/classroom observations in the same school to enable comparison between the results of one set and the other. By using different matched sets in different schools, the extent of the cross-validation information obtained can be increased. Analysis of the observation data will allow determination of the extent to which the both the FEPSI/TP and SETDA items are valid measures for the same

concepts and/or behavior. This will be quite valuable information since it will enable states and districts that may use the SETDA items to compare their results to those states and districts using the FEPSI/TP items.

The two performance measures developed, Problem-Solving Analysis and Technology Application Task, will also be cross-validated by concurrent and construct validity analysis relative to the three state-mandated standardized measures, TCAP-achievement, TCAP-value-added, and writing assessment. Multiple regression methodology and factor analyses will be used to interrelate the various subtests included in these measures. This is an important analysis because these performance assessments will provide valuable measures of student technological literacy and problem-solving skill not measured by the state-mandated standardized tests. The results of this analysis will enable determination of whether this is, in fact, the case, and will also be used as a basis for refinement of the performance tests where indicated.

Formative Evaluation of TEAM

A formal component of the proposed project will be ongoing formative evaluation of the TEAM approach. The evaluation will be conducted yearly and include as data sources (a) survey responses about the evaluation process from site researchers and respondents (teachers, technology coaches, principals); (b) the cross-validation and psychometric data from the FEPSI-TP and achievement measures; and (c) stakeholder reactions to the E-TOTE data base and dissemination activities (see **Goal 3,** below). A written report of findings and recommendations will be prepared.

METHODOLOGY FOR GOAL 3

> Goal 3: Disseminate information about the evaluation plan, its implementation, and the results to other states and to school districts so they may learn from and replicate the approach.

The dissemination plan will be driven by two major components, one *nation-wide* and the other *state-wide* in focus. The nation-wide component will employ SETDA as a partner to support ongoing and comprehensive dissemination and communication in the following ways.

National Dissemination

SETDA's Scientifically Based Research Handbook. SETDA's Technical Assistance Partnership Project (TAPP) will develop a Handbook which includes the approaches, methodologies, and tools utilized by Tennessee and other grantees participating in TAPP. This Handbook will also allow grantees to provide lessons learned and recommendations based upon the evaluation experience. The compilation of evaluations of various interventions and methodologies will provide several models for replication and refinement. This Handbook will be a valuable tool for states, districts, schools, and educational technology leaders to use when approaching the issue of scientifically based research. Tennessee's evaluation program will be profiled in this Handbook and will include tools, methodologies, and methods of analysis.

Using the expertise and momentum from SETDA's NLI Toolkit, TAPP will compile, edit, layout, print and disseminate this Handbook to an audience of more than 5,000 technology policy makers and practitioners at the end of the three-year grant process. TAPP will ensure that representatives of educational technology stakeholders receive the Handbook, including USDOE, CCSSO, ELC, NAESP, NMSA, NASSP, AASA, NSBA, ISTE, CoSN, NCTM, NSTA, NEA, AFT, FETC, and the RTECs. The Handbook will be printed in hardcopy with a CD of materials upon completion of the grant. Additionally, the Handbook will be available via the SETDA website to expand the reach of the dissemination efforts. Participating states will distribute 200 copies of the Handbook to state colleagues, districts, and school technology leaders. Additionally, every SETDA member will receive 25 copies to distribute appropriately

within their states. This truly ensures that the evaluation projects will not be completed in isolation.

SETDA Interim Reports & Immediate Information. Several grantees will be working through challenging issues throughout the three-year grant cycle. In order to provide opportunities for collaboration and technical assistance among grantees, interim reports, best practices, and draft methodologies will be made available through a website. The site will be password protected so grantees can discuss the challenges privately. A site for dissemination of appropriate information to the public will also be provided through SETDA for the duration of the grant program.

State-Level Dissemination

At the state level, dissemination strategies will include the development of (1) a website for posting project activities, findings, and documents, (2) an E-TOTE database supplement, and (3) invited presentations and workshop sessions at regular and specially scheduled state and regional meetings. One of the responsibilities of the special project manager hired by the state to work with the Project Director will be to coordinate these various dissemination activities.

State-level website. A dedicated state-level series of web pages will be established to provide project progress and findings in a more timely manner than might be feasible through the SETDA technical assistance partnership. The pages will post all seminal documents related to the study and carry regular journal updates on instrumentation design and revision. The parameters of the research will be identified and all formative and summative reports will be published to the web. The cross-validation of the TEAM instruments and the instruments developed for the SETDA Common Data Elements Taskforce will be made available at the state-

level website. The SDE special project manager will also be responsible for setup and maintenance, under the direction of the project director.

 E-TOTE Data Base. In 2003, the E-TOTE survey marked the start of a yearly snapshot of the use of technology in Tennessee K-12 public schools and was the first of its kind in the state. The statewide inventory was designed to continue to be completed annually at each school and to make data available for measuring progress toward specified targets in key areas.

 The TEAM project will formalize and expand the E-TOTE reporting system by requiring all TnETL schools (and Technology ORBIT Centers in Year 3) to enter data from the formative evaluation tool set into an E-TOTE supplemental database, the design of which will be overseen by CNAC. The result will be a continually updated database that can be used (a) by individual schools for determining status and yearly progress, (b) for compiling state-wide norms for comparison or benchmarking purposes, and (c) for supporting ongoing research on technology integration progress by Tennessee schools and the variables that relate to integration success and increases in student achievement.

 Presently the E-TOTE database captures state and school level information concerning the educational technology infrastructure, some information concerning the degree of support for technology, the extent and type of professional development teachers receive, and some information concerning how teachers and students use technology. It will be extended to include student outcomes on the technology literacy performance assessments and will be linked to the state database containing student outcomes from the state-mandated testing program. It will also include the results of the TnETL formative evaluation toolset including school climate and school demographic and climate variables. To the extent feasible, E-TOTE will be extended to allow schools to enter information concerning specific technology initiatives (curriculum,

professional development, assessment, other) they are implementing. The inclusion of the formative evaluation data and student outcomes (and, possibly, information on specific initiatives) in E-TOTE will enable schools and the SDE to obtain a more complete picture of the progress they are making on the implementation of their impact of technology integration plan.

A second important step will be to add a search and structured query capability to E-TOTE that will enable the use of E-TOTE as a planning and evaluation support tool.   This will allow individual schools to search for instances of what works and what progress has been made in similar schools and use this as a guide for planning their own technology integration plan.

Presentations to Local State Stakeholders. Local stakeholders will be invited to study to the assessment model in order to employ it within their own district planning and improvement initiatives. The presentations will include the annual statewide technology conference (TETC), three regional Title I conferences held each year, and the annual Leadership conference. Upon the publication of the SBR Handbook by SETDA, a convocation of school improvement leaders from throughout the state will be provided with distribution copies in conjunction with a roundtable orientation to scientifically based research related to integrating technology into everyday teaching and learning. Statewide stakeholders will be encouraged to visit the TnETL schools, which will be expected to provide an overview of their project aligned with the assessment model. In this manner, districts will also be introduced to the ORBIT centers that are poised to provide the same quality professional development designed to change teacher practice in ways that positively influence student learning. School district strategic technology planners will be requested to employ the TEAM methods in their implementation of technology-supported school improvement efforts.

It is expected that the TEAM model will be modified throughout the project from input by the USDOE and USDOE research resources. Upon its validation, the model will be recommended to the State Board of Education. Adoption of the model will be recommended for incorporation into district-level strategic improvement plans, including technology plans.

As part of the final phase of the program, the technology coaches from the TnETL schools and the ORBIT centers will be taught by the CREP partner to use the TEAM assessment tools and techniques and training stipends for this process are part of the project budget. Subsequent use of the TEAM model will assist in building local capacity by effectively evaluating activities that incorporate technology in daily teaching and learning. It is only with this level of accountability made possible with the TEAM tools that the true implications for the learning process can be realized.

A presentation on progress and outcomes will be made at meetings of the ATEC and the Technology subgroup of the Southern Regional Education Board. Additional components of the dissemination plan will be the preparation of policy briefs in both paper and CD form for distribution throughout the state. The dissemination products from SETDA will be brought to the state level to complement those presentations delivered by the Program Director, project manager, and coaches from the TnETL and ORBIT participants.

Conclusion

The project design presented in this section is a thorough, feasible, and methodologically sound experimental design for determining the effectiveness of the TnETL-ORBIT intervention. As an intervention, the professional development coaching model is intended to support teachers

in the integration of educational technology into their instruction in a manner that fosters higher levels of student achievement and technological literacy for both teachers and students.

The performance measures have been carefully chosen to relate clearly to the intended outcomes. The evolution of the project through its three levels is designed to expand the model, thereby contributing to the build-out of state capacity for evaluating these complex interventions.

As a result of the training incorporated as part of this intervention, the TnETL-ORBIT coaches whose schools have been study subjects will themselves ensure that the model can continue to be employed. By incorporation into the fabric of the design of the ongoing ORBIT centers, the TEAM model will be "institutionalized" as a key component in these centers as they continue the intervention within their service areas.

Finally, implementation documentation and dissemination activities have been constructed with careful attention to generating information useful in guiding replication of strategies.

PROJECT PERSONNEL

The Tennessee Department of Education, the University of Memphis Center for Research in Education Policy, CNAC, and SETDA, the major partners in this proposal, are Equal Opportunity/Affirmative Action organizations. The University of Memphis, a Tennessee Board of Regents institution, is an Equal Opportunity/Affirmative Action University committed to education of a non-racially identifiable student body.

The Tennessee Department of Education will contract with the following parties to conduct the work delineated in this project proposal:

1. The Center for Research on Educational Policy at The University of Memphis (Steven Ross, Ph.D., Principal Investigator and Deborah Lowther, Ph.D. Associate Principal Investigator).

2. The CNA Corporation (Daniel Burke, Ph.D., Arthur Sheekey, Ph.D., Neil Carey, Ph.D., Linda Cavalluzzo, Ph.D.)

3. State Education Technology Directors Association (SETDA) (Melinda George, Executive Director, Mary Ann Wolf, Ph.D., and Sara Hall)

Tennessee Department of Education

Jerry Bates is the Director of Applied School Technology for the Tennessee Department of Education and will serve as the Project Director. She is the chief architect of the TLCF2001 pilot and EdTech LAUNCH-ORBIT programs, creator of the Tennessee E-TOTE annual online data survey, and designer of the first competitive grant proposal for developing on-line course facilitators for technology professional development in the state. She has worked with teachers and administrators in Tennessee since 1995, focusing on the effective use of technology in the classroom. She presents regularly at state and local technology conferences, particularly on technology integration in ordinary classroom teaching and learning situations. She holds an

Ed.S. degree from the Peabody College of Education, Vanderbilt University (1973) and has

served Tennessee as classroom teacher, education consultant (technology), Director of Teacher

Leadership, and Director of Applied School Technology. In this latter position, she directs the

state's Title II Part D program and works collaboratively with the various federal project

personnel. She is a co-chair of SETDA's Core Data Elements task force. She represents

Tennessee on SREB's Technology Committee. She has also served as MIS training coordinator

for a mid-size legal firm, designed and programmed microcomputer applications for a mid-size

public hospital in North Carolina, and custom-built a curriculum mapping product for school

districts in Tennessee.

Center for Research in Education Policy at The University of Memphis

Steven M. Ross is the Principal Investigator for the research study. Dr. Ross is Director

of the Center for Research in Education Policy at the University of Memphis where he is also

Professor of Educational Psychology with a Ph.D. in Education Psychology from The

Pennsylvania State University (1974). Dr. Ross has first-hand experience with the TnETL

project, as his Center holds the contract to conduct the external evaluation study for the TLCF

2001 pilot program, the predecessor to TnETL. He holds the Lillian and Morrie Moss Chair of

Excellence in Urban Education at the University of Memphis (2001-present). His scholarship is

represented by 122 publications in refereed journals, 7 books, 28 book chapters, and 224 papers

presented at professional meetings. A review of his recent publications reveals research

emphasis on technology integration, school improvement and restructuring. For the past nine

years, Dr. Ross has served as Research Editor of *Educational Technology Research and*

Development.

Deborah L. Lowther will serve as the Associate Principal Investigator for the research study. Dr. Lowther is a Senior Faculty Researcher for CREP at the University of Memphis where she serves as an Associate Professor of Instructional Design and Technology with a Ph.D. in Educational Technology from Arizona State University (1994). Through CREP, Dr. Lowther not only served as Project Director of the external evaluation study for the TLCF 2001 pilot program, but has served in this capacity for the following high-profile technology initiatives: 1) Schools for Thought Challenge Grant (Vanderbilt University/Metropolitan Nashville Schools); 2) Co-NECT School Reform model (Cambridge, Massachusetts/Memphis City Schools); 3) Technology Integration Institute (Brazos-Sabine Connection/TLCF-Texas DOE); 4) Any-Time, Any-Where Learning: Laptop Project (Walled Lake Consolidated School District, Walled Lake, Michigan); 5) Learning Without Limits – Laptop Project (Detroit Public Schools); and 6) Start Technology Initiative (West Orange CISD, West Orange, TX). Dr. Lowther is also beginning her fourth year as ATEC's Principal Investigator for Professional Development. In this role, she provides technical assistance to Kentucky, Tennessee, Virginia, and West Virginia. With regard to scholarship, Dr. Lowther and Dr. Gary Morrison co-authored *Integrating Technology into the Curriculum*, for which the 3rd Edition is being released spring 2004. This book is ranked as one of the top five technology integration textbooks in the nation and received the Educational Communications and Technology Foundation's 2001 "Outstanding Book in Instructional Technology" Award. Dr. Lowther, Dr. Gary Morrison and Dr. Steve Ross are currently under a second contract with Prentice Hall to co-author *The Internet as a Tool for Student Learning* (release Fall, 2004). Dr. Lowther's research interests center on the K-12 environment and examine both the impact of integrating technology into the curriculum and the impact of school

reform. Her scholarly activities include ten publications in refereed journals, six book chapters, 20 technical evaluation reports, and 53 presentations at international/national conferences.

The Center for Research in Educational Policy is funded by the State of Tennessee as one of five Centers of Excellence located at The University of Memphis. CREP's mission is to implement a research agenda associated with educational policies and practices in the preK-12 public schools of Tennessee and the nation and to provide a knowledge base for use by educational practitioners and policymakers. Research outcomes are intended to not only describe the complexities of educational phenomena but also offer recommendations for action.

Since 1989, the Center has served as a mechanism for mobilizing community and university resources to address educational problems and to meet the University's commitment to primary and secondary schools. Functioning as a part of the College of Education, the Center seeks to accomplish its mission through a series of investigations conducted by Center personnel, College and University faculty, and graduate students. The Center's research agenda is developed through analysis of persistent or emerging issues in schools and their communities, changes occurring in teacher education programs, and recommendations from educational authorities.

Through work in schools for over a decade, the Center has contributed to Tennessee policy decisions regarding teacher preparation and licensure, school governance and site-based decision making, and public school reforms. Additionally, the Center has gained national recognition for its contribution to discussions of issues such as reform of teacher education, educational equity, educational technology, school reform and restructuring, urban and multicultural education, interventions for at-risk students, and using formative evaluation methods for school improvement decision-making.   Dr. Steven M. Ross, the Center Director, is

one of the leading educational researchers in the nation, and has served in the past few years a a consultant to OERI (IES), the Department of Education (CSR, Title I, and Technology), New American Schools, National Clearinghouse for Comprehensive School Reform, The What Works Clearinghouse, SIIA, AEL, SERVE, and numerous others.

Implementation of the Center's mission, with its local, state, and national focus, is illustrated in the current research agenda for the 2001-2002 school year. On a local level, the Center is currently involved in 8 separate research projects with the Memphis City School District, Shelby County School District, and other area schools, as well as community outreach/development programs involving Goals for Memphis, MIFA, Les Passees, and the Assisi Foundation. To inform state-level educational policy decision-making, the Center currently has 5 evaluation contracts with the State of Tennessee. The resulting evaluations, conducted in over 250 Tennessee schools, address diverse areas including literacy instruction, classroom technology use, professional development for principals, and teacher education and retention. Also in fulfillment of the national portion of its mission, the Center is currently conducting various program evaluations and research studies in over 500 schools in 15 different states.

CNA Corporation

Daniel Burke, Ph.D., is Deputy Director for Education at the CNAC in Arlington, Virginia, with whom the Tennessee Department of Education will contract for services delineated in the management plan. With a doctorate in molecular biology from Purdue University, he spent a major portion of his career as a researcher and educator in biology at the university level. At CNAC, Dr. Burke wrote the successful application for the ATEC awarded by USDOE, which serves four states, including Tennessee. Dr. Burke will provide overall

management support for CNAC and will assist in school observations, oversee the extension and enhancement of E-TOTE, develop the decision-support tools to be used with E-TOTE, and oversee CNAC's contribution to all reports and other documentation. Dr. Burke is the PI of CNAC's NSF award for Empirical Research on Critical Issues in Recruiting and Retaining the Mathematics and Science Teaching Workforce. Dr. Burke is currently developing a system dynamics-based computer model and simulation tool to examine the possible results of resource allocation and policy changes on the recruitment and retention of a high-quality teacher workforce. He is co-PI of CNAC's NSF study of systemic reform. At NSF, Dr. Burke served as Senior Staff Associate for System Reform where he worked with 25 large urban school districts, 23 states, and six rural programs. This work gave him extensive knowledge of the spectrum of programs (induction, mentoring, professional development) aimed at increasing teacher quality and improving student outcomes. He chaired the group that planned NSF's response to the shortage in math and science teachers, considering the entire continuum of a teacher's professional life from pre-service or alternative certification through induction and mentoring to the design of professional development to support effective career long learning for teachers. He was a key member of the NSF review team that examined its Collaboratives for Excellence in Teacher Program, and helped design the modification of the NSF Alliance for Minority Participation Program aimed at preparing minority undergraduates in science and math majors for careers in K-12 teaching. At Seton Hall University (SHU), he served as Director of the Science/Math Education Program and designed courses in the teacher education program.

Arthur Sheekey, Ph.D., as Director of the Appalachian Education Technology Consortium, will serve in an informal advisory role to the project, capitalizing on his vast array of professonal contacts and experience in working with state and school leaders across the

country. Sheekey's professional network and incessant literature survey activities afford him a unique perspective with which to help the partners stay informed on matters of significance. Sheekey also will ensure that the assurances of in-kind support from the ATEC and the contract level support for the CNAC portion of the TnETL-1 project are maintained. It is expected that Sheekey will take an active part in arranging meetings with partners.

Neil Carey, Ph.D., will perform the cross-validation activities described in the proposal and provide support in carrying out the random assignment work proposed.   Dr. Carey is highly qualified in psychometrics and has expertise in coordinating and conducting random assignment, controlled experimental studies. Dr. Carey worked on a random assignment study to evaluate whether computer-based training could be substituted for hand-on training for tactical microwave satellite repairers.

Dr. Carey was the project director of a Job Performance Measurement Project. This congressionally mandated study was designed to determine the relationship between aptitude (as measured by a Vocational Aptitude Battery, VAB) and hands-on job performance. The work was overseen by a committee of the National Academy of Sciences, which commended CNAC for the high degree of rigor with which it was conducted.

Dr. Carey also has a strong background in research on teacher issues. He was the principal investigator for a study of teacher-training programs designed to attract scientists and engineers from the private sector into math and science teaching.

Linda Cavalluzzo, Ph.D., will have a major role in the school observation and statistical data analysis activities. Dr. Cavalluzzo is an expert on quantitative methods including a variety of statistical and econometric techniques used in program evaluations. Much of her work in education deals with factors that contribute to teacher quality. She is the PI of CNAC's "Study

of National Board Certification in Miami-Dade County Public Schools" and a recently completed NSF award, "An Empirical Test of the Theory of Systemic Reform" study (during which she observed a great number of classrooms) and co-PI of CNAC's NSF award for studying the quality of the teaching workforce study. In each of these studies, she leads the development of econometric models of the systems and the multivariate statistical analysis of these models.

State Education Technology Directors Association (SETDA)

Founded in the fall of 2001, the State Educational Technology Directors Association (SETDA) is the principal association representing the state directors for educational technology. SETDA's goal is to improve student achievement through technology. The mission is directed by three organizational principles 1) to promote national leadership in educational technology to support achievement in lifelong learning, 2) to provide professional development for state educational technology directors, and; 3) to build partnerships to advance learning opportunities.

STEDA's involvement in the project comes in the form of its Technical Assistance Partnership Project (TAPP). TAPP builds upon SETDA's relationships, infrastructure, and expertise, including:

- strong relationship with educational technology leaders nation-wide
- trusted and effective dissemination vehicles that reach all state directors and staff
- in-person meetings on issues states are facing, such as scientifically-based research
- membership dedicated to professional growth
- professional expertise to execute the communication dissemination services

Melinda George – Project Oversight

Melinda G. George is the Executive Director of the State Educational Technology Directors Association (SETDA). Prior to joining SETDA, Ms. George was the Director of the Education Division for the Software & Information Industry Association (SIIA). In this role, Ms. George was responsible for meeting the needs of SIIA education technology member companies by providing research, data and expert analysis of issues relating to education technology. In addition, Ms. George facilitated networking and partnership opportunities with businesses, education associations and federal and state government officials and provided financial information and events targeted toward helping SIIA member companies to build and grow their businesses.

Ms. George also worked as an education technology lobbyist for SIIA, working to secure ongoing and consistent funding for schools. For more than six years, Ms. George was the author of the *SIIA State Technology Initiatives Report* providing a state-by-state glance at the education technology initiatives occurring across the fifty states.

She is a former Washington, DC schoolteacher and technology coordinator, and also contributed to the U.S. Office of Technology Assessment's 1995 report, *Teachers and Technology: Making the Connection*. She holds a Masters Degree in Public Administration from The American University and received her Bachelors in American Culture from Vassar College.

Mary Ann Wolf, Ph.D. – TAPP Content Development

Mary Ann Wolf is the Project Manager for the State Educational Technology Directors Association (SETDA).   In this position, Wolf oversees many of SETDA's major initiatives including the SETDA Common Data Elements Initiative, the State Policies Matrix and the State Budget Survey. Wolf is also the lead staff person for the State Policy Leadership Committee, the Professional Growth Committee and the Data Collection Subcommittee.

Wolf's background includes experience in education and consulting. Wolf taught fifth grade in a Virginia public school and studied education leadership at the University of Virginia. She recently conducted extensive primary research for her dissertation on teacher time. The focus of her dissertation involves opportunities for administrators to support teachers in order to improve student learning. She also directed the Women Education Leaders in Virginia conference in 2000.

Wolf also worked for KPMG Peat Marwick as a consultant for federal and state funded grant programs. In this role, she assisted state employees in efforts to network with staff members from other states in order to share best practices, provide technical assistance, and coordinate professional development efforts. Her consulting projects primarily focused on the writing, implementation and reporting of federal grants.

Wolf has a Ph.D. in Education from the University of Virginia, a Masters Degree in Elementary Education from the George Washington University and received her Bachelors in Accounting and Marketing from Georgetown University.

Sara Hall – Marketing and Outreach

Ms. Hall is the Manager of Membership and Outreach for the State Educational Technology Directors Association (SETDA). Hall oversees outreach to potential partners, members and the corporate community. She is also responsible to the creation of print quality publications, development of membership benefit programs, as well as the enhancement of SETDA's Website.

Hall's background includes six years experience in marketing and communications through her work as the Director of Membership & Marketing at the Software Publishers Association now known as SIIA. While there, Hall created and administered membership

benefit programs, developed and implementing professional publications, and directed the membership communication strategies for the organization.

Since 1999, Hall's efforts were devoted to the Children's Web Surfing Alliance, Inc; a 501-C3 educational organization that administered an educational Internet Treasure Hunt for teachers, students, and parents. As the founder of this program, Hall created print materials, developed a rich online experience for teachers and students, solicited sponsorships, and reported the results of each contest to stakeholders.

Tennessee Department of Education: Support Staffing

The staff for the Title II Part D program in the Tennessee Department of Education includes Jerry Bates full-time as Director, and an education consultant who provides part-time detail work for the formula portions of this title of NCLB. No administrative assistance is available in either case. Therefore, in order to responsibly coordinate the ESETP project and ensure that the fully articulated TEAM model is brought to policy level, it will be necessary to hire an executive administrative assistant to serve as project manager under the direction of Ms. Bates. An individual with sterling administrative abilities, an understanding of research design, and knowledge of teacher quality issues will be sought. The services of a good administrative services assistant will also be provided from grant funds to provide basic communication, document production, support and scheduling services.

RESOURCES

The Tennessee Department of Education, CREP, CNAC and SETDA are dedicated not only to their respective parts of the project, but also to ensuring that the entire endeavor is undertaken with collaborations that will make the project more than the sum of its partner members. Each partner has been solicited for, and is dedicated to providing, the particular expertise for which it is known. The collective effort promises to generate results that will be institutionalized as practice that outlive the federal funding provided by the grant. The services of CREP, CNAC, and SETDA will be provided under a contractual relationship with the SDE.

SDE Support, Commitment, and Sustainability

The SDE's commitment is evident in the fact that it embraces the challenge of modifying its TnETL-2 competitive design to incorporate a true scientific (random selection) process. While this change may not be initially welcomed by school districts who anticipate applying, and especially not by those schools whose applications were not funded in TnETL-1, the SDE will carefully explain the rationale for the change. SDE will take pains to ensure that the competitive nature of the grant program is not compromised in this design. In a similar manner, the SDE has agreed to channel the ORBIT program so that it can accommodate a random design. In contrast to what the SDE anticipates, the random selection process may, in fact, be welcomed by some participants.

Fifteen percent of the professional time of the Project Director (Jerry Bates) is provided as in-kind contribution by the state. State web space and publishing service are provided at no cost to the project. Office space, supplies, computer and internet access, telephone and fax service are all provided for existing and future project personnel at the state level. The state will

continue to fund the three-year external evaluation study already contracted for TnETL-1. The state will also continue to fund the E-TOTE annual survey database, for which the TEAM database will develop a supplement.

SDE commitment is further evidenced by its plan to bring the TEAM model forward for State Board approval as a policy measure for the school districts in the state. The fact that the Project Director cannot devote full time effort to this project comes, in part, from the ongoing demands that managing the TnETL school technology coach program. This effort is particularly critical at the outset of each TnETL program year when the new technology coaches are moving into roles that are foreign to them. Through efforts carefully orchestrated with mentor coaches and university partners, the state is committed to maturing the program so that it can exist without such intense involvement from the SDE in the future. A factor that makes a major contribution to this designed independence is the very assessment model which this grant proposal undertakes to secure. Thus, through this program, the SDE only intensifies its commitment to the project which will be woven into the very fabric of its plan to ensure that its teachers have carefully designed opportunities to mold their pedagogical practice to use technology tools as part of the everyday teaching and learning process. The addition of a viable accountability model is critical to this mission.

CREP Support and Commitment

CREP's project support is seen in the proactive stance it has taken in the design of the project research proposal and the advice it has already provided to SDE regarding ways the current external evaluation plan for TnETL can be scaled up into a true randomized scientific study. CREP is also committed to making the FEPSI/TP process available statewide once the

project has demonstrated its value to all stakeholders. CREP has agreed to participate in taking the stage when it is time to present the scientific findings to professional audiences both inside and outside the state. Without this commitment and the expertise and experience of CREP, the design of this proposal would never have assumed tangible form. SDE is confident that the same high level of performance will characterize the work CREP does under contract for the TEAM project. A letter of support from Dr. Ross is presented in Appendix C. CREP's research service will be provided under a contractual agreement with SDE.

CNAC Support and Commitment

CNAC contribution: CNAC/ATEC is committed to funding year 1 and year 2 of the TnETL-1 external evaluation. In addition, an ATEC in-kind contribution of $26,000 in both year 1 and 2 for the development and analysis of the student performance task will be maintained. The state will contract with CNAC to perform the work outlined in this proposal. CNAC will provide the coordinating service of the ATEC director, Dr. Arthur Sheekey, to ensure the project partner collaboration proceeds smoothly.

CNAC facilities: CNAC has both the quantitative (regression, analysis of variance, and hierarchical linear modeling) and qualitative analysis (encoding class and school observation data, data from interviews and focus groups) software needed to support this project. They also will also provide conference and teleconferencing facilities for management and dissemination meetings.

CNAC relevance: this project is fully aligned with the two central areas of education research at CNAC, educational technology and issues relating to high quality teachers. A key area in CNAC's research education research program is fostered through its role as the lead

organization in ATEC, one of the 10 US Department of Education-funded Regional Technology Education Consortia. CNAC also has three current research projects whose central focus are the training, recruiting and retention, and impact on students of high quality teachers. Thus, this proposed project meshes very well with CNAC's strengths in education research.

SETDA Support Resources and Commitment.

SETDA's resources include:

1. An effective communication vehicle to state technology directors in all 50 states and two territories.
2. Staff that provides quality products and services to its membership.
3. Strong relationships and reputation among education technology leaders nationwide.
4. A membership base of enthusiastic people willing to learn.
5. Momentum and credibility to deliver on our promise as evidenced by SETDA's NLI Toolkit and Rollout.
6. In-kind donation of time and resources to amply deliver the services outlined in this proposal.

SETDA is committed to creating a valuable resource that stands the test of time. With guidance from all stakeholders, the Handbook will be a compilation of methodologies, strategies, lessons learned, and tools that help to successfully implement scientifically-based research. By publicizing the highlights and specific uses of this resource, the guide will extend far beyond the Federal financial assistance period.

MANAGEMENT PLAN

This project is undertaken by the State of Tennessee Department of Education who will contract with CNA Corporation, the University of Memphis' Center for Research in Educational Policy, and SETDA. The State shall serve as the fiscal agent. However, the state shall also serve in additional capacities, as it is intimately involved in the project for which these assessment methods are being used, tested, and developed.

Through the Project Coordinator acting under the direction of the Project Director, the State will provide overall project management guidance and will be ultimately responsible for seeing that contractors perform their responsibilities in a timely manner. The State will modify the year 2 and year 3 competitive Title II Part D grant requests for application to incorporate participation in the ESETP TEAM project and will subsequently ensure that random selection from qualified applicants is undertaken for year 2 projects. The state will require the year 3 ORBIT participants to utilize the Tennessee EdTech Accountability Model. Further, the state will ensure that all participants in the competitive program, whether treatment or control group, will authorize the presence of and cooperate in the work of the researchers, including student participation in the FEPSI-TP procedures. The state will, in consultation with its collaborative partners, determine the ways that the existing E-TOTE statewide survey will be modified to accommodate the additional data collection process instituted by TEAM. The state will make available to the researchers the student-level achievement test data for students in schools involved in the study and, to the extent permissible by statute, the teacher effect data. Such individual data, whether teacher or student, must remain anonymous, and all collaborative partners shall agree to maintain the data in the strictest confidence. The state will cooperate fully with the contractors who are responsible for conducting the research and analyzing and

promulgating the results. The state will ensure that existing evaluation funds from the current

TnETL-1 schools remain dedicated to the level 1 assessment project.

The *University of Memphis/Center for Research in Educational Policy* will: manage and

conduct the research (see data collection timeline); provide the researchers; collect the data;

perform data analysis; prepare the reports; work together with CNA and the state to procure an

appropriate web host and web design for the continuously updated progress reports; generate the

FEPSI reports for the state and all project participants, both treatment and control. CREP will

fulfill its current contract with the state for the three-year evaluation plan delineated for the first

Launch schools (TnETL-1) and will add data disaggregation components to the extent the pre-

data are available to do so.

The *CNA Corporation/ATEC* will procure the design, host, and collection of the web-

based information database; provide staff to assist with the site observation protocols, perform

the cross-validation between SETDA instruments and CREP instruments, and submit data

reports in accord with the schedules laid out herein and in line with the deadlines established by

the SETDA dissemination pattern. As an arm of CNA, the ATEC will continue to fund its

portion of the year 1 and year 2 assessment costs of the current TnETL project and honor its in-

kind contribution for the performance assessment and writing analysis of student products. CNA

will provide meeting venues in the Washington area, host the meetings, and provide logistic

support for the events.

The state will underwrite an agreement with SETDA to provide data on a scheduled basis

to regional and national convocations, to publish the summative reports and data instruments,

and to create the SBR Handbook featuring Tennessee's TEAM research. In addition to the

collaborative Website and consistent communications, SETDA's TAPP will host the following

informational sessions for partners to garner feedback, share, and learn from one another.

Quarterly Virtual Roundtables. Through SETDA, TAPP will convene all grant partners

for a virtual roundtable once each quarter. The topic of the roundtables will be timely and agreed

upon by the grant partners and will be determine depending on the needs of the group. The

roundtables will give grant partners the opportunity to discuss particular issues, including RFP

components, methodology development, evaluation implementation, and reporting. When

appropriate, SETDA will assist in identifying experts to provide information during the

roundtables. These roundtables will be facilitated by founding partners and/or experts in SBR

tactics, strategies, and implementation. The roundtables will be held via conference call and will

last one hour.

In-Person Roundtable. TAPP will convene at least one in-person roundtable at the

discretion of the grant partners. This roundtable will allow primary project contacts to have the

opportunity to discuss their experiences, issues, and plans during an in-person meeting with their

colleagues. This in-person roundtable may be held in conjunction with a national conference.

e-Newsletters. SETDA will initiate and encourage on-going communication among grant

partners, the USDOE, other primary project contacts, and experts. SETDA will provide

professional and pertinent quarterly newsletters with updates on the grant and grant partners'

experiences. SETDA staff will compile information from grant partners and guidance from the

USDOE for the newsletter.

Fiscal Accountability

The project manager will keep track of all expenditure requests and ensure that all are in

line with the budget. On a monthly basis, for fiscal accountability, the project director will

review ledger sheets from the SDE Office of Disbursements. The manager will review invoices

and submit requests for payment for approval by the Program Director. Three months before the

end of the federal fiscal year (in June), the project manager will prepare and present a budget-to-

actual analysis of the project to the Program Director. This reporting will be in preparation for

submitting the grant budget for the upcoming year, in line with the original budget requested as

part of the grant application. All fiscal reporting requirements established by the granting

authority will be met.

Data Collection Cycle

Data collection at the school level will follow the cycle shown in Table 5. (The research

questions and instrumentation have been discussed earlier.) The schedule for state achievement

tests is provided in the Timeline (Table 6).

Table 5. Data Collection Cycle

	Study Group	Control Group
November	Implementation Benchmarking	
Each Fall	Observations: Five 3-hour whole-school visits and five 1-hour targeted visits to observe technology lessons: SOM, Survey for Computer Use, Rubric for Student-Centered Activity	Observations: Five 3-hour whole-school visits and five 1-hour targeted visits to observe technology lessons: SOM, Survey for Computer Use, Rubric for Student-Centered Activity
Each spring	Observations: *Five 3-hour whole-school visits and five 1-hour targeted visits to observe technology lessons:* SOM, Survey for Computer Use, Rubric for Student-Centered Activity	Observations: *Five 3-hour whole-school visits and five 1-hour targeted visits to observe technology lessons:* SOM, Survey for Computer Use, Rubric for Student-Centered Activity
	Student Focus Groups Teacher Focus Groups Teacher Technology Questionnaire Principal Interview Technology coach interview and survey Implementation Benchmarking	Student Focus Groups Teacher Focus Groups Teacher Technology Questionnaire
Spring Faculty Meeting	Faculty surveys: TTQ and SCI	Faculty surveys: TTQ and SCI
Summer, Fall	Data analysis and Reports	

Timeline: TEAM

The timeline that follows represents the major components of the project distributed over the three-year term of the grant project. Due to the cyclical nature of many of the events, the timeline is given within the framework of an academic calendar. Annually recurring activities are shown as occurring "each year". Dated milestones are given with specific month and year and indicated by the circled arrow symbol ➲ . Feedback loop events (designated by the bracketed double arrow symbol [⇔]) are staged on a quarterly basis as working conference calls. The agenda for the calls will include reports on scheduled progress to date and will provide an opportunity to brainstorm for ways to improve both process and product without compromising the research design. In cases where modifications would significantly alter the research design, additional consultation with USDOE will be undertaken. Essentially, the feedback loop will fit within a Plan-Do-Study-Act model, with the conference calls focusing on studying what was done according to plan, in order to modify the subsequent action. A culminating event to project the plan into the future, independent of the federal grant financial support, will be scheduled and its recommendations published both on the state project web and in the SETDA product.

Table 5: Timeline for TEAM

When	What	Who
Academic Year (each year)	On-going sustained professional development in TnETL/ORBIT schools. Teachers and students employing technology as part of everyday teaching and learning	TnETL-1 (2003 ff) TnETL-2 (2004 ff) ORBIT satellites (2005 ff)
September (each year)	Implementation benchmarks	SDE Bates, CREP Ross/Lowther; TnETL-1, TnETL-2, ORBIT satellite subjects
YEAR 1 **YEAR 2** **YEAR 3**	**October 2003-September 2004** **October 2004-September 2005** **October 2005-September 2006**	**TnETL-1** **TnETL-1 and TnETL-2** **TnETL-1, TnETL-2 and ORBIT**
October 2003	➲ ESETP Grant award press event	SDE, CREP, SETDA (USDOE)

When	What	Who
	School already in session for 13 TnETL-1 schools awarded April 2003; professional development program underway	TnETL-1 treatment schools
	➲ Contracts: CNAC, CREP, SETDA	SDE Bates, contracts office
	➲ Set up URL for TEAM web on www.state.tn.us/education	SDE Bates, SDE webmaster
	(un)Freeze letter for SDE staff positions (project manager, administrative services assistant); hire	SDE Bates, Personnel
	Initiate defining E-TOTE database extensions, contract	CREP, CNAC, (SDE)
	➲ Identify 13 matched controls for TnETL-1; invite participation	CREP
October (each year)	➲ E-TOTE regular online data collection (through November)	SDE Bates, vendor, all TN schools
	➲ Statewide invitation to apply for EdTech competitive grants (intervention program) 2003: TnETL-2 (due January 2004) 2004: ORBIT (due January 2005)	SDE Bates
	➲ Presentations to State Leadership Conference	SDE Project Manager
	[⇔]Working conference call/meeting: take stock of process and progress; recommend refinements	SDE Bates and Project Manager, CREP, CNAC, (USDOE).
October 30 (each year)	*Publication of annual school report cards*	*SDE Office of Accountability*
October 2004 and subsequent months through September 2005	➲ Training for technology coaches from TnETL-1 and TLCF in use of TEAM instruments; codification of training package for ongoing dissemination	CREP, SDE Bates and Project Manager
October 2004	➲ E-TOTE extension data collection is online for use	CREP/CNAC, study participants
Fall (each year)	Fall data collections, level 1: Classroom observations, SOM, SCU, RSCA , faculty surveys (five 3-hour whole-school visits and five 1-hour targeted visits per school) **Treatment group only:** Implementation benchmarks (by November 1)	CREP, CNAC, Year 1: TnETL-1; year 2 add TnETL-2; year 3 add ORBIT satellites; and controls
Quarterly (each year)	[⇔]Virtual roundtables for grant partners e-Newsletters	SETDA, SDE Bates (CREP, CNAC), USDOE
November 2003	➲ Preliminary SDE TEAM web page; initiate diary (update monthly throughout program)	SDE Project Manager
	Coordination with Office of Evaluation for student test data including disaggregation and TVAAS	SDE Project Manager
	Acquire baseline student achievement data for TnETL-1 subjects	SDE Project Manager; CREP
	Review/refine random assignment process for TnETL-2 (2004 for Orbit Satellite cohort)	SDE Project Manager, CREP

When	What	Who
	• Establish SETDA private website for participant collaboration; use is continuous thereafter • Public access SETDA website for information dissemination; continuously updated	SETDA; SDE Project Manager
December (each year)	➲ NLI information events on ESETP programs; document collection for SETDA SBR Handbook	SETDA, SDE Bates (CREP)
	Letter of Intent to Apply for competitive EdTech grant	*Local Education Agencies (school districts); partnerships*
Early December (each year)	Public information event at TETC (Tennessee annual statewide technology conference)	SDE, CREP
	East TN Regional Title I conference presentation	SDE Project Manager; regional TEAM schools
January (each year)	[⇔] Working conference call/meeting: take stock of process and progress; recommend refinements	SDE Bates and Project Manager, CREP, CNAC, (USDOE).
February (each year)	*Competitive grant application deadline. 2004: TnETL-2; 2005: ORBIT*	*Local Education Agencies (school districts); partnerships*
February 2004	Test run E-TOTE database extensions	CNAC
	➲ Cross- validate TEAM instruments with SETDA instruments	CNAC
March (each year)	FETC conference presentations as arranged by SETDA	SETDA, SDE Project Manager or Program Direcctor
Spring 2004	➲ Finalize refinements to problem-solving analysis instrument and technology application task	CREP
Spring (each year)	*Administer TCAP and state writing tests (Gr. 3-8)*	*SDE, all TN schools*
	Collect spring data (all subjects): Classroom observations, SOM, SCU, RSCA, Problem Solving, Technology Application Task, TTQ, SCI (five 3-hour whole-school visits and five 1-hour targeted visits per school) **Treatment** group only: teacher focus group; principal interview; technology coach interview	CREP, CNAC. Year 1: TnETL-1; year 2 add TnETL-2; year 3 add ORBIT satellites; control groups
	Implementation Benchmarking	CREP, Year 1: TnETL-1; year 2 add TnETL-2; year 3 add ORBIT satellites
	West TN Regional Title I conference presentation	SDE Project Manager; regional TEAM schools
April (each year)	Respective competitive grant awards identifying TnETL-1, TnETL-2, and ORBIT awards	SDE Bates
	Competitive grant contracts; confirmation of key school leaders in grant recipients	SDE Bates; school districts/partnerships
	[⇔]Working conference call/meeting: take stock of process and progress; recommend refinements	SDE Bates and Project Manager, CREP, CNAC, (USDOE).
May (each year)	Professional development for new competitive grant recipients	SDE Bates, CREP/ATEC (Lowther)
	Typical month for end of school year	*Tennessee schools*

When	What	Who
June (each year)	National Education Computing Conference: project presentations	SETDA, SDE Project Manager (Bates)
	Budget review: budget to actual	SDE Project Manager, Bates (USDOE)
Summer (each year)	Middle TN Regional Title I conference presentation	SDE Project Manager; regional TEAM schools
	On-going professional development at individual and partnership TnETL schools /ORBIT centers	TnETL/ORBIT
	Release of student achievement data	*(SDE Office of Evaluation and Testing)*
	Cross-matching student achievement data with TEAM performance results	CREP
July (each year)	[⇔]Working conference call/meeting: take stock of process and progress; recommend refinements	SDE Bates and Project Manager, CREP, CNAC, (USDOE).
	Presentation to Annual Summer Institute for Technology Coordinators	SDE Project Manager; select participants
July 2006	➲ Projected publication of SETDA SBR Handbook (data projected)	SETDA
August (each year)	Data analysis for subjects to date; Prepare and deliver reports for study subjects	CREP
	Technology coach academies, new grant recipients	SDE Bates, CREP/ATEC (Lowther), mentor coaches
	Typical start of school year in Tennessee	
August 2005	➲ Final cross-validation report for SETDA and TEAM tools	CNAC
September 2005 and months following	[⇔]Culminating review and refinement of model; establish advisory task force	SDE Bates and Project Manager, CREP
Beginning September 2005	➲ Recommendation of TEAM evaluation protocol for adoption by State Board of Education, incorporation into local district strategic technology plans, and use in School Improvement Planning	SDE Bates
Summer 2006	➲ Prepare total project evaluation; reports; dissemination documents	CREP, CNAC, SDE Bates and Project Manager (USDOE)

Feedback Loop

Using the Plan-Do-Study-Act model, the formative evaluation of the assessment model

will have certain scheduled periods of analysis for the process itself. While indicated by the

feedback loop in Table 6, for review convenience, these events are extracted below in table 7. It

is expected that upon entering into the cooperative agreement with USDOE, the feedback loop

will be adjusted to accommodate the larger schedule envisioned by USDOE. Thus, this schedule

is predicated on the review cycle expected of the internal partners. A protocol will be developed

during the initial conference call for use in recording active reflection after each public or

stakeholder meeting so that recommendations are noted, shared, assessed and conceivably

implemented.

Table 7: Feedback Loop Events

When	What	Who
October (each year)	[⇔]Working conference call/meeting: take stock of process and progress; recommend refinements	SDE Bates and Project Manager, CREP, CNAC, (USDOE).
Quarterly (each year)	[⇔]Virtual roundtables for grant partners e-Newsletters	SETDA, SDE Bates (CREP, CNAC), USDOE
January (each year)	[⇔] Working conference call/meeting: take stock of process and progress; recommend refinements	SDE Bates and Project Manager, CREP, CNAC, (USDOE).
April (each year)	[⇔]Working conference call/meeting: take stock of process and progress; recommend refinements	SDE Bates and Project Manager, CREP, CNAC, (USDOE).
July (each year)	[⇔]Working conference call/meeting: take stock of process and progress; recommend refinements	SDE Bates and Project Manager, CREP, CNAC, (USDOE).
September 2005 and months following	[⇔]Culminating review and refinement of model; establish advisory task force	SDE Bates and Project Manager, CREP

Through coordinating with the partners in this project and the USDOE, the Tennessee

Department of Education believes it can achieve the objectives of the proposed project on time

and within budget. The responsibilities associated with timeline actions are shown in the

timeline, as are the milestone events. It is understood that the issue of student achievement data

and teacher-effect (TVAAS) data may sometimes be outside the realm of the Program Director's

control. However, every effort will be made to ensure that the Office of Assessment and Testing

is apprised in a timely manner with the precise data needs with the researchers require in order to

complete the analysis and render reports on time.

[HUMAN SUBJECTS NARRATIVE – Uploaded separately]

[BUDGET NARRATIVE – Uploaded separately]

Compliance with General Education Provisions Act (GEPA): Section 427.

Since the schools serving as subjects in the research undertaken in this project are chosen by random selection, it is certain that the student mix will represent differences in gender, race, national origin, color, and disability. Age differences will certainly be present among the faculty and administrators involved in this project. The TnETL model is designed to ensure that all teachers at the Launch schools are engaged in the professional development program. Care will be taken to emphasize to applicants that provisions must be made to ensure that students regardless of differences are thoroughly involved in the project. Other activities which the SDE will use in support of its compliance with GEPA include:

- Including accessibility guidelines as part of the required component of any professional development activity sponsored by TnETL and ORBIT program schools;

- Using technology to communicate with key stakeholders about the TEAM project;

- Including written statements in public communications that provide potential participants with the options of special needs accommodations; and

- Providing professional development, conferences, and other activities only in facilities that have met accessibility guidelines.

The Tennessee Department of Education, an agency of the executive branch of the Tennessee State government, is an Equal Opportunity/Affirmative Action employer.

The University of Memphis, a Tennessee Board of Regents institution, is an Equal Opportunity/Affirmative Action University. It is committed to education of a non-racially identifiable student body.

[ASSURANCES AND CERTIFICATIONS: submitted via eGrants]

[APPENDICES: Uploaded separately]

The Tennessee EdTech Accountability Model (TEAM)

An Application for a Federal Discretionary Grant:

Evaluating State Education Technology Programs (ESETP)

Tennessee ESETP Application (CFDA 84.318A)

Lana C. Seivers,
Commissioner of Education

APPENDIX A: References

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APPENDIX B: Vitae

STEVEN M. ROSS

PERSONAL DATA	
Steven M. Ross	Home: (901) 755-6654
224 Eagle Spring Cove	Office: (901) 678-3413
Cordova, TN 38018	E-Mail: smross@memphis.edu

EDUCATION		
The Pennsylvania State University	B.A.	1969
The Pennsylvania State University	M.S.	1972
The Pennsylvania State University	Ph.D.	1974

Undergraduate Major:	Psychology
Graduate Major:	Educational Psychology

PROFESSIONAL ASSOCIATIONS	
American Psychological Association	Fellow
American Educational Research Association	Member
Mid-South Educational Research Association	Member
Association for Educational Communications & Technology	Member
International Congress for School Effectiveness and School Improvement	Member

EXPERIENCE			
Instructor	Continuing Education	The Pennsylvania State University	1973 – 1974
Instructor	Psychology	Lock Haven State College, Lock Haven, PA	Spring Semester 1974
Evaluator	Mitre Corporation	McLean, Virginia	Summer, 1974
Assistant Professor	Educational Psychology	The University of Memphis	1974 – 1979
Associate Professor	Educational Psychology	The University of Memphis	1980 – 1985
Professor	Educational Psychology	The University of Memphis	1985 – Present
Senior Researcher	Center for Research in Educational Policy	The University of Memphis	1995 – 2001
Director	Center for Research in Educational Policy	The University of Memphis	2001 – Present

COURSES RECENTLY TAUGHT	
Theories of Learning	Undergraduate
Individual Differences and Learning	Graduate
Educational Statistics	Undergraduate and Graduate
Educational Research	Graduate
Computers in Education	Undergraduate and Graduate
Thesis Writing	Graduate
Educational Assessment	Graduate

HONORS AND DISTINCTIONS

1.   NDEA Fellowship for graduate study at the Pennsylvania State University, 1971-1973.
2.   Graduate Student Associate, Southwest Regional Laboratory, Summer, 1971.
3.   Distinguished Teaching Service Award, University of Memphis, 1980.
4.   Phi Delta Kappa Professional Research Award, Memphis Chapter, 1983.
5.   Elected Fellow, Division 15, American Psychological Association, 1986.
6.   Visiting Scholar, National Center for Research on Improving Postsecondary Teaching and Learning. University of Michigan, Summer 1987.
7.   Distinguished Research Award, University of Memphis, 1987.
8.   Distinguished Teacher Service Award, University of Memphis, 1988.
      (First eligibility since 1980; no longer eligible)
9.   Memphis State University nominee, CASE Professor of the Year Award, 1989
10.   Superior Performance in University Research (SPUR) Award, University of Memphis, 1990, 1991, 1992
11.   Distinguished Research Award, University of Memphis, 1993.
12.   Board of Visitors Eminent Faculty Award, University of Memphis (first recipient), 1993
13.   Editor, *Educational Technology Research and Development*, 1993-present
14.   Editorial Board, *Journal of Education for Students Placed At Risk*. 1995-present
15.   Editorial Board, *Computers and Human Behavior*, 1994-present
16.   Invited testimony, U.S. House of Representatives Subcommittee on Early Childhood, Youth, and Families, Committee on Education and the Workforce, June 26, 1998.
17.   **Invited panelist on comprehensive school reform, discussion with Secretary of Education Richard Riley, March 16. 1999.**
18.   **Lillian and Morrie Moss Chair of Excellence in Urban Education, 2001**

SCHOLARSHIP	
Publications in Refereed Journals	122
Books	7
Book Chapters	28
Papers Presented at Professional Meetings	224

SELECTED RECENT PUBLICATIONS

Ross, S. M., & Smith, L. J. (1998). Improving school achievement and inter-group relations for children placed at risk. European Journal of Intercultural education, 9(2), 141-154.

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Lowther, D. L., & Ross, S. M. (in press). When each one has one: The influences on teaching strategies and student achievement of using laptops in the classroom. Educational Technology Research and Development.

Morrison, G. R., Ross, S, M., & Kemp, J. E. (in press). Designing Effective Instruction 4th Edition. Hoboken, NJ: Wiley & Sons.

SUMMARY OF INTERESTS

During the past ten years, I have worked extensively with school districts, both regionally and locally, to develop and evaluate programs for improving student achievement. The primary focus of these studies has been schools predominantly serving disadvantaged inner-city minority children. Currently, I am working on the formative and summative evaluation of Comprehensive School Reform (CSR) projects at schools in various states. Additional ongoing research projects are studies of school restructuring designs as they are implemented in Memphis City Schools and other school districts and of professional development schools in seven national sites as part of the NEA Teacher Education Initiative (NEA-TEI).

Deborah L. Lowther

Education

Degree	Discipline	Institution	Year
Ph.D.	Educational Technology	Arizona State University	1994
M.A.	Curriculum and Instruction	University of Texas at El Paso	1988
B.S.	Secondary Education	University of Texas at El Paso	1980

Experience

Rank/Position	Department/Division	Institution	Period
Associate Professor	Instructional Design and Technology	University of Memphis College of Education	2000 to present
Assistant Professor			1995 to 2000
Program Evaluator	Phoenix Urban Systemic Initiative (NSF Grant)	Maricopa County Community College District (MCCCD)	1994 to 1995
Program Evaluator	Comprehensive Regional Center for Minorities (NSF Grant)		1991 to 1995
Adjunct Faculty	Psychology in Education	Arizona State University (ASU)	1995
Teaching Assistant	Educational Technology		1989 to 1994
Graduate Associate	Morrison Institute of Public Policy		1990-1991
Middle School Teacher	Valley View Middle School	Ysleta Ind. School Dist., El Paso, TX	1982-1989

Honors/Awards

Honor/Award	Institution/Organization	Year
Doctoral Student Mentoring Award	University of Memphis. College of Education	2002
James W. Brown Publication Award for Outstanding Book in Instructional Technology	Educational Communications and Technology Foundation	2001
Finalist for Distinguished Teaching Award	University of Memphis	1998
Outstanding Teaching Award	Arizona State University	1994
Regents Academic Scholarship	Arizona State University	1989-1991

Service ~ National

Educational Technology Research and Development Journal	*Editorial Board Member* Research Section	2000-2002
	Consulting Editor	1996-present
	• Research Section and Development Section	
Association for Educational Communications and Technology	*Board of Directors*	2000-2001
	International Convention Chair : AECT 2000 - Long Beach, CA	1999-2000
	President Research and Theory Division	1999-2000
US. Department of Education	*Grant Reviewer* Challenge Grants	1999
TechTrends Journal	*Guest Editor* Special Edition: Technology in the K-12 Schools	March 1998

Scholarship

- Books

Lowther, D. L., Morrison, G. R.& Ross, S. M. (In Progress). *The Internet as a Tool for Student Learning.* Englewood Cliffs, NJ: Merrill/Prentice Hall.

Morrison, G. R.& Lowther, D. L. (In Progress). *Integrating Computer Technology into the Classroom* (3rd Ed.). Englewood Cliffs, NJ: Merrill/Prentice Hall.

Morrison, G. R.& Lowther, D. L. (2002). *Integrating Computer Technology into the Classroom* (2nd Ed.). Englewood Cliffs, NJ: Merrill/Prentice Hall.

Morrison, G. R., Lowther, D. L. & DeMeulle, L. (1999). *Integrating Computer Technology into the Classroom.* Englewood Cliffs, NJ: Merrill/Prentice Hall.

- Book Chapters

Lowther, D. L. & Morrison, G. R. (In press). Integrating Technology into the Problem-Solving Process. In D. S. Knowlton & D. Sharp (Eds.) *Problem-Based Learning for the Information Age New Directions for Teaching and Learning Series.* San Francisco: Jossey-Bass.

Lowther, D. L., Jones, M. G., & Plants, R. (1999). Impact of Web-based Education on Teacher Education Programs. In B. Abbey (Ed.) *Instructional and Cognitive Impacts of Web-Based Education.* Harrisburg, PA: Idea Group Publishers.

Morrison, G. R. & Lowther, D. L. (2001). Information management. In A. Costa (Ed.) *Developing Minds:* ASCD Publications.

Jones, G. R., Harmon, S. W., & Lowther, D. L. (2002). Internet-based learning and Technology Integration: A Systemic Approach. In R. Reiser and J. Dempsey (Eds.) *Foundations, Trends, & Issues in Instructional Technology*; Englewood Cliffs, NJ: Prentice Hall.

Ross, S. M., Alberg, M., Smith, L. & Lowther, D. (in press) Using Classroom Observations as a Research and Formative Evaluation Tool in Educational Reform: The School Observation Measure. In S. Hilberg and H. Waxman (Eds.) *New Directions for Observational Research in Culturally and Linguistically Diverse Classrooms.* Santa Cruz, CA: Center for Research on Education, Diversity & Excellence.

Lowther, D. L. & Sullivan, H. J. (1996). Perceptions of Educational Technology Among K-12 Teachers and Educational Technologists. In D. Ely (Ed.) Educational Media and Technology Yearbook. Englewood, CO: Libraries Unlimited.

- Journal Publications

Lowther, D. L., Ross, S. M., & Morrison, G. R. (In Press). When each one has one: The influences on teaching strategies and student achievement of using laptops in the classroom. *Educational Technology Research and Development.*

Ross, S. M. & Lowther, D. L. (2003). Impacts of the Co-nect school reform design on classroom instruction, school climate, and student achievement in inner-city schools. *Journal for Educational Research on Students Placed At Risk, 8*(3), 215-246.

Ross, S. M., Alberg, M., Smith, L., Anderson, R., Bol, L., Dietrich, A., Lowther, D. L., & Phillipsen, L.(October, 1999). Using whole-school restructuring designs to improve educational outcomes: The Memphis Story At Year 3, *Teaching and Change.*

Lowther, D. L. & Morrison, G. R. (1998). The NTeQ model: A framework for technology integration. *TechTrends*, 43(2), 33-38.

Bober, M. J., Sullivan, H. J., Lowther, D. L., & Harrison, P. (1998). Instructional Practices of Teachers Enrolled in Educational Technology and General Education Programs. *Educational Technology Research and Development*, 46(3), 81-97.

Bol, L., Nunnery, J. A., Lowther, D. L. , Dietrich, A. P., Pace, J. B., Anderson, R. S., Bassoppo-Moyo, T. C. & Phillipsen, L. C. (1998). Inside in and outside in: The effects of internal and external support for change. *New American Schools: Education in Urban Society*.

Lowther, D. L., Bassoppo-Moyo, T., & Morrison, G. R. (1997). Moving from Computer Literate to Technological Competent: The Next Educational Reform. *Computers in Human Behavior, 14*(1), 93-109.

Smith, L., Maxwell, S., Lowther, D., Hacker, D., Bol, L., Nunnery, J. (1997). Activities in schools and programs experiencing the most, and least, early implementation successes. *School Effectiveness and School Improvement*, 8(1), 125-150.

Ross, S. M., Troutman, A. Horgan, D., Maxwell, S., Laitienen, R., Lowther, D. (1997). The Success of Schools in Implementing Eight Restructuring Designs: A Synthesis of First-Year Evaluation Outcomes. *School Effectiveness and School Improvement, 8*(1), 95-124.

Lowther, D. L. & Sullivan, H. J. (1994). Teacher and Technologists Beliefs about Educational Technology. *Educational Technology Research and Development, 42*(4), 73-87.

- *Web Publications*

Lowther, D. L. (2001). Prentice Hall Technology Super Site. Companion web site for five Prentice Hall textbooks that focus on technology integration into the curriculum. [Online] *http://cw.prenhall.com/bookbind/pubbooks/technology-cluster/*

- *Recent Presentations*

Lowther, D. L., Ross, S. M. & Morrison, G. R. (October, 2003). The Laptop Classroom: The Effect on Instruction and Achievement. Paper to be presented at the 2003 Association for Educational Communications and Technology Convention, Anaheim, CA.

Ross, S. M, Lowther, D. L.. & Morrison, G. R. (April 2003). Chicago, IL. When Each One Has One: The Influences on Teaching Strategies and Student Achievement of Using Laptops in the Classroom. Paper presented at the 2003 American Educational Research Association National Conference, Chicago, IL.

Lowther, D. L., Grant, M. M., Marvin, E. D. (March, 2003). The roles and responsibilities of technology coaches. Paper presented at the 2003 Kentucky Teaching and Learning Conference, Louisville, KY.

Clark, F. & Lowther, D. L. (March, 2002). Impact of the Cognitive Apprenticeship Model on Preparing Pre-Service Teachers to Effectively Plan For the Use of Technology in Instruction. Paper presented at the Society for Information Technology and Teacher Education 13th International Conference, Nashville, TN

Ross, S. M. & Lowther, D. L. (April, 2002). The impact of the Co-nect design on classroom instruction, school climate, and student achievement in five inner-city schools. Paper presented at the 2002 American Educational Research Association National Conference, New Orleans, LA.

Lowther, D. L. (July, 2001). Using the Basics to Achieve Exceptional Learning. Paper presented at the International Learning Conference, Spetses, Greece.

Lowther, D. L., Ross, S. M. & Morrison, G. R. (June, 2001). Evaluation of a Laptop Program: Successes and Recommendations. Paper presented at the 2001 National Educational Computing Conference, Chicago, IL.

Lowther, D. L. & Morrison, G. R. (October, 2000). The Role of Technology in Developing Higher-Order Thinking Skills. A paper presented at the 2000 Association for Educational Communications and Technology Convention, Denver, CO.

Morrison, G. R., Lowther, D. L., & DeMeulle, L. (February, 2000). iNtegrating Technology for inQuiry (NTeQ): A Problem-based Learning Model. ?" A paper presented at the 2000 Association for Educational Communications and Technology Convention, Long Beach, CA.

Arthur D. Sheekey
The CNA Corporation

Summary

Dr. Sheekey was appointed Director of the Appalachian Technology in Education Consortium (ATEC) in July 2001. ATEC is a regional consortium funded by the U.S. Department of Education for the purpose of fostering the effective use of technology to enhance education and to help close the digital divide. From April 1998 until July 2001, he served as the Coordinator for Learning Technologies for the Council of Chief State School Officers (CCSSO). He represented CCSSO on matters relating to telecommunication technologies and works with the States' directors of educational technology, organizes CCSSO's annual national state educational technology leadership conference, and coordinates technical assistance activities directed to helping schools and libraries in receiving universal services (E-Rate) discounts. From 1995-1998, Dr. Sheekey was President and Senior Associate at the Public Set-vice Telecommunications Corporation (PSTC). While at PSTC, he worked as a consultant to national, state and local education agencies and organizations. During that time, he represented Information Gatekeepers, Inc. - a publishing firm based in Boston, participated as a panelist at several national education conferences, and published numerous articles on education policy and telecommunications. His book, *Education and Telecommunications: Critical Issues and Resources (1997)* focused on emerging policies and investments relation to the national goal for achieving universal service. A second book, *How to Ensure Ed/Tech Is Not Oversold and Underused*, edited by Dr. Sheekey, was published by Scarecrow Press (2003).

From 1980-1990, Dr. Sheekey was a senior policy analyst in the Office of Educational Research and Improvement at the U.S. Department of Education. His responsibilities involved the management of programs and planning initiatives focusing on education research and applications of telecommunications technologies for delivering education and related public services. As a ComSci Fellow in 1991-1992, he worked in the Office of Plans and Policy at tile Federal Communications Commission and in the White House Office of Science and Technology Policy (OSTP). At the FCC, he contributed to the preparation of a special hearing and report, Networks of the Future. At OSTP, he prepared background testimony statements and special reports on science and engineering education for the Science Advisor and President's Council of Advisors on Science and Technology.

Dr. Sheekey served as Director of the Education Information Resources Division and Acting Director of the Division of Postsecondary and Adult Education in the Office of Research. He was a management and budget specialist on President Carter's Reorganization Project at the Office of Management and Budget. Prior to the creation of the Education Department in 1980, he was the principal planning and budget officer for tile Assistant Secretary for Education at tile Department of Health, Education, and Welfare.

Dr. Sheekey is a member of Phi Delta Kappa, an international association of professional educators, and guest lecturer at the University of St. Thomas in St. Paul, MN. He has been a board member of the Alliance for Public Technology, senior associate and contributing editor for the Youth Policy Institute, Senior Associate at tile American Association for Higher Education, Senior Fellow at the Consortium of Universities of the Washington Area, and Resident Scholar at Stanford University's Graduate School of Education. He taught high school and junior high school science for five years in New Jersey.

Education

Stanford University, postdoctoral study (1970-1971)
Catholic University of America, Washington, DC, Ph.D. Instructional technology *(1970)*
Seton Hall University, South Orange, NJ, MA in history and secondary education *(1964)*
New Jersey City University, BS in science education/biology *(1960)*

Work Experience

2001 Project Director, Appalachian Technology in Education Consortium, The CNA Corporation, Alexandria, VA

1998-2001 Coordinator for Learning Technologies, Council of Chief State School Officers, Washington, DC.

1995-1998 President and Senior Associate, Public Service Telecommunications Corporation, Alexandria, VA.

1980-1995 Senior Policy Analyst, Office of Educational Research and Improvement (OERI), U.S. Department of Education

1974-1980 Planning Officer/Policy Analyst, Office of the Assistant Secretary for Education (DHEW), U.S. Department of Education

1967-1974 Director for Program Planning and Education Specialist, Bureau of Elementary and Secondary Education, U.S. Office of Education.

1965-1966 Wallington High School, Wallington, NJ. Science and History Teacher

1960-1964 Junior High School, Nutley, NJ. Science Teacher

Selected Publications

How to Ensure E/Tech is Not Oversold and Underused, (editor). Scarecrow Press, 2003.

Digital Television's Role to Extend Opportunities for Education. *R*eport published by the Benton Foundation, Washington, DC, 2000.

What States Need to Know About Preparing Teachers for Technology and Standards-based Reform, *(*editor*)*. A report on the CCSSO Educational Technology Leadership Conference, March 2000

Investing, Assessing and Communicating Results of Learning Technologies, *(e*ditor*)*. A report on the CCSSO State Educational technology Leadership Conference, Feb. 1999

A New Federal-State Partnership to Equalize Access to Education and Information, The Journal of Information Policy, Vol. 1, No. 2, Sept. 1998

Education and Telecommunications: Critical Issues and Resources, *(author). B*ook published by IGI Press, Boston, Sept. 1997

Public and Private Interests in Networking Schools, Households, and Communities, Tech Trends, April/May 1997

Telecommunications Services for Education: Abundant Choices, CORPS Report, Jan. 1997

The Electronic Village: Telecommunications is Changing the School Board's Role, The American School Board Journal, Jan. 1997

Create Testbeds to Learn About Electronic Learning, Youth Record, Youth Policy Institute, Oct. 15, 1996

Telecommunications Technologies for Education: Measuring Outcomes *A* commissioned paper for tire Montgomery County Public School System, July 1996

A Depoliticized and More Effective Federal. Role in Education, Youth Record, June 15, 1996

To Equalize Educational Opportunities: A Networked Community vs. A Collection of Wired Schools, Youth Record, Youth Policy Institute, Feb. 15, 1996

Equalize Educational Opportunity: Linking the School and Home, Youth Record, Dee, 15, 1995

Telecommunications Development for Schools: Implications for Governance, Finance, Policy Making and Management of Schools. *A* commissioned paper prepared with Richard Hezel for the Office of Educational Research and Improvement, U.S. Department of Education, 1995

Hispanic Americans Compete Successfully in the Global Economy, Youth Record, Oct 31, 1995

If They Build It, Will You Come? The American School Board Journal, April 1995

Relating the Visions of Telecommunications to the Realities of Families, Schools, Libraries and Public Service Agencies, Youth Record, Jan. 31, 1995

Remaking Public TV, The American School Board Journal, May 1994

Daniel D. Burke

SUMMARY:

Dr. Burke serves as CNAC's Deputy Director for Education and Principal Investigator for Research, Appalachian Technology in Education Consortium. Dr. Burke is an expert on mathematics and science education with extensive experience in universities, government, and non-profit institutions. Dr. Burke is the PI of CNAC's NSF award for Empirical Research on Critical Issues in Recruiting and Retaining the Mathematics and Science Teaching Workforce. Dr. Burke is also developing a system dynamics-based computer model and simulation tool that will be used to examine the possible results of various resource allocation and policy changes on the recruitment and retention of a high-quality teacher workforce. He is co-PI of CNAC's NSF study of systemic reform. At NSF, Dr. Burke served as Senior Staff Associate for System Reform, Directorate for Education and Human Resources. As such, he worked with 25 large urban school districts, 23 states, and six rural programs. He led the Directorate's Technology Integration in Education Program and its Committee on the instructional workforce. In these latter positions he had oversight responsibility for developing NSF programs to foster the integration of technology in education and programs to deal with the need to increase the supply of high quality mathematics and science teachers.   At Seton Hall University (SHU), he served as Director of the Science/Math Education Program and worked with the SHU School of Education to design courses in their teacher education program.

EDUCATION:

Earlham College, Richmond, IN, 1962. AB, Biology.
Purdue University, West Lafayette, IN, 1968. Ph.D., Microbiology.
University of Washington, Seattle, WA, 1968-1970. Postdoctoral fellowship,
    Developmental Biology.

PROFESSIONAL EXPERIENCE:

Principal Investigator, Technical Services, Appalachian Technology in Education Consortium,
    Alexandria, VA. 2000-
Deputy Director for Education, Center for Naval Analyses Corporation, Alexandria, VA. 1999-
Senior Staff Associate for Systemic Programs, Office of the Assistant Director, Education and
    Human Resources (EHR) Directorate, National Science Foundation (NSF), Washington, DC.
    1995-1999.
Program Director, Urban Systemic Initiative, EHR/NSF, Washington, DC. 1993-1994.
Director, Science/Mathematics Education Program, Seton Hall University, South Orange, NJ.
    1991-1993.
Director, Center for College Teaching, Seton Hall University, South Orange, NJ. 1989-1990.
Associate Professor, Department of Biology, Seton Hall University, South Orange, NJ. 1983-
    1996. (Chair, 1983-1989).
Associate Professor and Chairman, Biology Department, College of Liberal Arts, Mercer
    University, Macon, GA. 1979-1983.
Assistant Professor, Microbiology Department, University of Illinois, Urbana, IL. 1970-1978.

SELECTED GRANTS:

Appalachian Technology in Education Consortium, US Department of Education, 2000-2004.
Inquiry-Based Laboratories in Recombinant DNA Technology for Secondary School Teachers,
New Jersey Department of Higher Education (NJDHE), 1993-1995.
Pre-freshman Enrichment Program, U.S. Department of Energy. 1993-1994.
Development of Hands-On, Inquiry-Based Instruction in Secondary School Biology, National
    Science Foundation (NSF). 1992-1996.
Consortium for the Development of K-8 Master Science Teachers, NJDHE. 1992-1995.
Hands-On, Inquiry-Based Secondary Science Instruction, NJDHE. 1992-1995.
Governor's Grant for Excellence in Science Education: Magnet School for Training   Science
    Teachers, New Jersey Department of Education. 1992-1994.
Seton Hall University - Irvington Board of Education Alliance for Elementary Science, American
    Association for Higher Education. 1991.
New Jersey Institute for Collegiate Teaching and Learning, NJDHE. 1989-1994.
Honors Curriculum in Biology, NJDHE. 1989-1990.
Investigative Laboratories in Introductory Biology, NJDHE. 1988-1989.
Development of Basic Skills and Analytical Thinking in a Biology Major's Program, NJDHE.
    1984, 1986.
Title III, General Education Activity, US Department of Education (USED). 1982.
Upward Bound: Special Emphasis in Science, National Demonstration Project, USED. 1980-81.

SELECTED EDUCATIONAL PUBLICATIONS AND CURRICULUM MATERIALS:

Karpala, A. L., R. Williams and D.D. Burke, "High School/University Collaborations," in Tested
    Studies in Laboratory Education, C. Goldman, ed., Carolina Biological Supply Company.
    1991.
Burke, D.D., "Incorporation of Critical Thinking, Mathematics and Writing into Introductory
    Biology" in Strategies for Success, C. Johnson, ed. Benjamin/Cummings, November, 1990.
Burke, D.D., "Molecular Genetic Analysis in Yeast" in Tested Studies in Laboratory Education,
    C. Goldman, ed. Carolina Biological Supply Company. 1990.
Kumar, L. and Burke, D.D. and C. O'Conner, "A Biology Laboratory for the Underprepared
    Student," in Enhancing Critical Thinking in the Sciences, L. W. Crow, ed, Society for College
    Science Teaching. 1989.
Kumar, L. and Burke, D.D., "An Innovative Biology Laboratory for the Underprepared Biology
    Major." Amer. Biol. Teacher 51:155. 1989.
Kumar, L. and Burke, D.D., "Incorporation of Remedial Skill Training into Introductory
    Biology." New Jersey Science Teachers Bulletin, 32:29. 1986.
Burke, D.D., "Use of a Model System to Investigate Koch's Postulates." in Tested Studies in
    Laboratory Education, J. Glase, ed., Kimball-Hunt Publishing, Dubuque, IA. 1981.
Burke, D.D., "A Programmed Approach to Investigative Laboratories in Microbiology," Amer.
    Biol. Teacher, 41:484. 1979.
Burke, D.D., "Mini Investigative Laboratories in Microbiology for Non-Science Students," AIBS
    Ed. Rev., 5:1. 1976.

Burke, D.D., "Molecular Genetics," in Life: The Individual, The Species, ed. T. Lane, C.V. Moseby, St. Louis. 1976.

Burke, D.D., Slide/Audio cassette series on biochemical identification tests. 1976-77.

Burke, D.D. and Burke, S., "Dilutions," Introduction to Aseptic Technique," videotapes. 1977.

NINE RESEARCH PUBLICATIONS IN MICROBIOLOGY/MOLECULAR BIOLOGY IN REFEERED JOURNALS:

SELECTED OUTSIDE ACTIVITIES:

Member, Technology Advisory Group, Urban Systemic Program Superintendents Coalition, Washington, DC. 2000.

Invited Speaker, NSF Systemic Reform Initiatives National Meeting, Washington, DC. 99.

Invited Participant, "Theory of Systemic Reform," meeting sponsored by University of Texas, Santa Fe, NM. 1998

Invited Speaker, Association of Science and Mathematics Educators. Milwaukee, WI. 1997

Invited Participant, "Evaluation and Future of the Equity 2000 Program," The College Board, New York City, NY. 1997

Invited Speaker, " Systemic Reform in K-12 Science and Mathematics Education." National Science Teachers Association. New Orleans, LA. 1996

Invited Speaker, "Critical Thinking in the Biology Curriculum," Trinity College, Hartford, CT. 1996.

Foundation Speaker, American Society for Microbiology (ASM). 1993-1995.

Invited Speaker, ASM Annual Meeting on Undergraduate Education, Washington, DC. 1995.

Keynote Speaker, Southeastern ASM Annual Meeting, Athens, GA. 1994.

Workshop on Critical Thinking and the Design of Laboratory Courses, San Juan, PR, Lexington, VA, San Diego, CA., Atlanta, GA. 1993.

Workshop on Critical Thinking in Elementary Education, Irvington, NJ. 1993, 1992.

Workshop on Designing Courses to Incorporate Critical Thinking, ASM Annual Meeting. New Orleans, LA. 1992. Dallas, TX. 1991.

Workshop on Training Secondary School Teachers to Serve as Mentors for High School Student Research, Seton Hall University. 1991.

Workshop on Critical Thinking for University High School, Newark, NJ. 1991 Archdiocese of Newark School District, Newark, NJ. 1992 Irvington School District. Irvington, NJ. 1991.

Visiting Scientist, Minority Student Research Career Support Program, Inter-American University, San Germain, PR. 1991. University of the Virgin Islands, USVI. 1988.

Education and Training Committee, Research and Development Council of New Jersey. 1990-1992.

Faculty Fellow, New Jersey Institute for Collegiate Teaching and Learning. 1989-1990.

Workshop on University-Secondary School Collaborations, Association for Biology Laboratory Education (ABLE), Springfield, MO. 1990.

Visiting Lecturer, Wuhan University, Wuhan, P.R.C. 1988.

Linda C. Cavalluzzo

Dr. Linda Cavalluzzo is a senior economist with extensive experience in empirically based, policy-oriented research. Her training and experience cut across a range of methodological areas, including econometrics, survey design and administration, focus group and case study research, design of longitudinal student data bases, and analysis of long-term outcomes from education.

Much of Dr. Cavalluzzo's work in education deals with factors that contribute to teacher quality. She is the PI of CNAC's "Study of National Board Certification in Miami-Dade County Public Schools" and of our recently completed NSF award, "An Empirical Test of the Theory of Systemic Reform" study and is co-PI of our NSF award for studying the quality of the teaching workforce. In each of these studies, she leads the development of econometric models of the systems and the multivariate statistical analysis of these models. Her education work includes an assessment of post-secondary schools including development of a cost-effective investment strategy to achieve education goals. Dr. Cavalluzzo has had a key role in a succession of high-impact studies in support of the Navy and the Joint Chiefs of Staff, including participation in an executive panel task for the Chief of Naval Operations on the Role of Education for Naval Officers in the 21st Century

Dr. Cavalluzzo is also a project director for the Appalachian Regional Technology in Education Consortium. In that role, Dr. Cavalluzzo is supporting KY and WV with development of data systems and evaluation of the equity, effectiveness, and efficiency of their Virtual High School policies and programs.

Dr. Cavalluzzo has conducted large-scale empirical studies of the effectiveness of training on the acquisition of skills and broken new ground in defining and measuring different types of training activities and in the identification and use of performance-based measures of achievement. As a senior advisor to the CNA study group on readiness, she developed the theoretical model used to build empirical estimates of the interrelationships between resource areas and unit readiness.

Education

Ph.D., 1984, State University of New York at Buffalo
M.A., 1977, State University of New York at Buffalo
B.A., 1975 (magna cum laude), State University of New York at Buffalo

Relevant Experience

CNAC   1979 – 1985, 1994 - Present

Analyst and project director for the Workforce, Education and Training Team, Resource Analysis Division

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Analyst and project director for the Logistics and Readiness Group, Institute for Naval Studies Division

Union College   **1987 - 1993**

Visiting Faculty, Department of Economics. Supervised senior theses, managed the social sciences statistics lab, and taught courses in statistical methods, Gender Issues in Economics, Industrial Organization, and Principles of Economics.

Resource Consultants, Inc.   1985 - 1987

Director, Manpower, Personnel and Training Analyses Group. Supervised six professionals plus associated support staff. Principal investigator and program manager for selected studies.

Journal Publications and Book Chapters

"Competition, Small Business Financing, and Discrimination: Evidence from a New Survey," with Ken Cavalluzzo and John Wolken, *Journal of Business*, Volume 75 (4), October 2002.

"Competition, Small Business Financing, and Discrimination: A Detailed Report," with Ken Cavalluzzo and John Wolken, *Finance and Economics Discussion Series 1999-25,* February 1999, Federal Reserve Board, Washington , D.C.

"Market Structure and Discrimination: The Case of Small Businesses," with Ken Cavalluzzo, *Journal of Money Credit and Banking*, Vol. 30 (4), November 1998

"Railroad Deregulation: Pricing Reforms, Shipper Responses and the Effects on Labor," with James MacDonald, *Industrial and Labor Relations Review,* Vol.50 (1), October 1996

"Unionization and Productive Efficiency," with Dennis Baldwin. *Efficiency Measurement: Techniques and Applications,* Eds. Harold Fried, Knox Lovell, and Shelton Schmidt, 1993, Oxford University Press

"Nonpecuniary Rewards in the Workplace: Demand Estimates Using Quasi-Market Data," Vol 73(3), *Review of Economics and Statistics,* August, 1991

Selected Presentations

The Road to Improvement: Access, Attainment, and Achievement in a CPMSA District, AERA, Chicago, April 2003

VSTE, Contemplating a Public Virtual School In Your District, Alexandria, March 2003

An Analysis of Systemic Reform and Student Achievement, AERA, April 2002

Selected Reports

Case Studies of High Schools on College Campuses: An Alternative to the Traditional High School Program, with Christopher Corallo (AEL), and Will Jordan, CNAC, AEL, Charleston, WV, December, 2002

Who Should Fund Virtual Schools?, with Michael Higgins, December 2001, www.the-atec.org

Background Paper for New Collaborative Schools: An Overview of At-Risk High School Students and Educational Programs Designed to Meet Their Needs, with Thomas Husted, CNAC ERM 01-0101, December, 2001

Library and Lab Costs at Postsecondary Schools: Benchmarks for the Naval Postgraduate School, with Dan Burke, CAB D0000482.A1, Feb 2000

Understanding Enlisted Personnel Losses, with Jeremy Arkes, CAB 98-89, CNAC, August 1998

Econometric Comparisons of Enlisted and Civilian Pay, with Jeremy Arkes, CAB 98-88, CNAC, August 1998

A Bottom-Up Assessment of Navy Flagship Schools, with Don Cymrot, CRM 97-24, Center for Naval Analyses, January 1998

A Predictive Model of Navy Second-Term Retention (U) (CS Moore, HS Griffis, LC Cavalluzzo) (48 P) CNA, SPM, Research Memorandum 95-245, April 1996

Joint Personnel Readiness: Is the Whole Just the Sum of the Parts? (U) (DJ Cymrot) (12 P) CNA, SPM, Research Memorandum 95-6, August 1995

Neil Carey, PhD, MS
Tests and Measurement/Psychometrics

Summary

Dr. Carey has been active in the field of testing and measurement of change in psychological processes for over 15 years. He has been a reviewer for several scholarly publications, and has long experience using multivariate techniques to determine the factor structure of tests, quality of data collection, the need for data imputation, reliability of measurement, and the predictive relationships among variables. He has published this work in *Educational and Psychological Measurement, Military Psychology, Review of Educational Research, Phi Delta Kappan, Military Medicine, and Journal of Personnel Evaluation in Education.*

While at Center for Naval Analyses, Dr. Carey directed the Marine Corps' Job Performance Measurement Project, a congressionally directed joint-service effort that was overseen by the National Academy of Sciences. In that effort, he directed the data collection efforts and analyzed the validity of new computerized tests above both the paper-and-pencil and computer-administered adaptive versions of the Armed Services Vocational Aptitude Battery (ASVAB). He analyzed the measurement properties of surrogate measures for hands-on job performance measures. The Marine Corps Job Performance Measurement Project was singled out by the National Academy of Sciences for the excellence of its data collection and analytical efforts.

While at the RAND Corporation, Dr. Carey developed a set of achievement indicators for a project sponsored by the National Science Foundation, focusing on tests and items in the National Assessment of Educational Progress (NAEP). This work was published in several RAND reports and in an article in <u>Phi Delta Kappan</u>. He also developed a computerized test for tactical microwave satellite operators that was published in a RAND report.

EDUCATION

Ph.D.	Educational Psychology, Stanford University, 1985
MS	Mathematical Statistics, Stanford University, 1984
BA	Psychology, with Highest Honors, University of California, 1978

Project Director, Marine Corps Job Performance Measurement Project

Research Analyst, Evaluation of Tactical Microwave Satellite Operators Course

Research Analyst, Indicators of Mathematics and Science Education

Project Director, Survey of Programs for Training Mathematics and Science Teachers.
When Neil was an analyst at the RAND Corporation, he directed an effort funded by the Ford Foundation to survey teacher trainees and administrators at innovative programs for training mathematics and science teachers. This effort involved design, development and fielding of a nationwide survey that included paper-and-pencil questionnaires, interview forms, and elite interviews. The results were published as two RAND reports and were presented to a conference of the American Association for the Advancement of Science (AAAS).

Research Analyst, National Schools and Staffing Survey. Neil participated in planning for the sampling, questionnaire design, and reporting of surveys of the nation's schools, funded by the Department of Education. He identified variables to be measured, gathered alternative item forms for measuring those variables, then revised questionnaires on the basis of feedback from focus groups.

Research Analyst, Study of Tactical Microwave Satellite Operators. Neil was a research analyst and the field coordinator of a training experiment for the US Army. In that effort, he developed hands-on and computerized tests for radio technicians, created background and attitude surveys, and provided administrative oversight of all field data collection at Fort Gordon, Georgia. We found that computer videodisk training could substitute for hands-on training with expensive radio equipment. The results of this work were reported in a RAND publication.

Research Analyst, Indicators of Mathematics and Science Education. This work for the National Science Foundation developed of a series of indicators for the health of the nation's science and mathematics education. In this project, he analyzed educational and psychological research on learning, curriculum, and testing of mathematics skills and concepts. The project resulted in several RAND publications and an article in Phi Delta Kappan. In this effort, Neil also recruited and convened a panel of academic experts on science education.

Research Analyst, Center for Policy Research in Education (CPRE). This consortium of educational researchers studied the enactment and implementation of state education reforms made in response to the Nation at Risk report. He interviewed and reported the observations of principals, teachers, and parents in several districts across the country. Results were recounted in several RAND reports.

Selected Outside Publications

Paul W. Mayberry and Neil B. Carey, The Effect of Aptitude and Experience on Mechanical Job Performance, Educational and Psychological Measurement, Vol. 57(1), February 1997.

Neil B. Carey, Computer predictors of mechanical job performance: Marine Corps Findings, Military Psychology, 6(1), 1-30, 1994.

Neil B. Carey, Does Choice of a Criterion Matter?, Military Psychology, 4(2), 103-117, 1992.

Neil B. Carey, Setting Standards and Diagnosing Training Needs with Surrogate Job Performance Measures, Military Psychology, 3(3), 135-150, 1991.

Shavelson, R.J., Carey, N.B., & Webb, N. (1990). Achievement indicators: Options for a Powerful Policy Instrument. *Phi Delta Kappan, 71*(9), 692-697.

Pecheone, R., & Carey, N.B. (1989). The validity of performance assessments for teacher licensure: Connecticut's Ongoing Research. *Journal of Personnel Evaluation in Education*, *3*, 115-149.

Carey, N.B. (1989). Instruction. In Shavelson, R.J., L.M. McDonnell, & J. Oakes (Eds.), *Indicators for Monitoring Mathematics and Science Education*, pp. 123-146. Santa Monica, CA: The RAND Corporation. RAND/R-3742-NSF/RC.

Carey, N.B., & Shavelson, R.J. (1989). Outcomes, achievement, participation, and attitudes. In Shavelson, R.J., L.M. McDonnell, & J. Oakes (Eds.), *Indicators for Monitoring Mathematics and Science Education*, pp. 147-191. Santa Monica, CA: The RAND Corporation. RAND/R-3742-NSF/RC.

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MELINDA G. GEORGE

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EXPERIENCE

State Educational Technology Directors Association (SETDA), Executive Director, Arlington, VA (January 2002-Present).

- Build new organization representing 50 states, the District of Columbia and the Bureau of Indian Affairs to provide national leadership in educational technology to support achievement in lifelong learning.
- Oversee all SETDA initiatives and events that provide value to membership of state educational technology directors.
- Conduct ongoing strategic planning in conjunction with the SETDA Board of Directors to identify priorities, goals and objectives and to establish budget, timelines and deliverables.
- Organize national conferences and events that provide professional growth opportunities for state educational technology directors.
- Develop and manage SETDA budget of more than $650,000 and identify new funding opportunities.
- Recruit and retain SETDA members and partners.
- Manage and supervise three SETDA professional staff persons and one administrative staff person.
- Provide outreach and communicate SETDA purposes to key educational stakeholders and the corporate community.

Software and Information Industry Association (SIIA), Director, Education Division, Washington, D.C. (August 2000 – January 2002).

- Lead SIIA Education Division, comprised of more than 225 member companies and more than 1300 member contacts. Serve as liaison between companies and the association, spokesperson for education technology industry and networking facilitator for business to business projects.
- Develop, manage and oversee all Education Division projects including identifying priorities with the SIIA Education Division Board, setting project goals and objectives, and establishing budget, timelines and evaluation procedures. Work with members and SIIA staff to ensure completion.
- Develop and manage annual Education Division budget of more than $240,000, including monitoring expenditures and reporting at Board meetings.
- Recruit education technology companies for membership with the association. Develop marketing and promotional campaign and communicate value proposition to recruit and retain members.
- Brief SIIA members and committees on key education technology initiatives.
- Serve on state and national policymaking coalitions including the National Coalition for Technology in Education and Training (NCTET), the Committee for Education Funding

(CEF), and the 21st Century Teachers Network (21CT), to advance education technology and the software industry.

- Supervise and evaluate SIIA Education Division Manager and interns.

Software and Information Industry Association, Director, Education Policy, Washington, D.C. (July 1995 – August 2000).

- Lobbied key state and federal policy officials on initiatives affecting education technology and the software industry. Organized SIIA members in advocacy efforts at the state and federal level.

- Created and published the **"SIIA State Technology Initiatives Report,"** providing detailed state-by-state information on current technology initiatives for K-12 and post-secondary education. Developed through network of more than 200 state education leaders and published three times annually.

- Organized and managed SIIA member networks and advocacy task forces in support of specific policy issues.

Office of Technology Assessment (OTA), U.S. Congress, Contractor, Washington, D.C. (July - October 1993).

- Developed and implemented a study assessing the attitudes and use of technology by teachers in a major metropolitan area.
- Developed survey questionnaire and interviewed study participants and conducted focus group discussions.

Murch School, Teacher and Grade Chairperson, Fourth/Fifth Grades, Washington, D.C. (August 1990 - June 1993).

- Developed a strategic plan for implementation of integrated computer technology in school.

- Responsible for classroom management and organization.

- Monitored and evaluated progress of individual students and communicated regularly with parents.

EDUCATION

The American University, Washington DC
Master of Public Administration, 1995
Vassar College, Poughkeepsie, New York
Bachelor of Arts in American Culture, 1990

New York State Early Childhood and Elementary Teaching Certification, May 1990

SELECTED ACTIVITIES AND INTERESTS

- Member, Board of Directors, National Coalition for Technology in Education and Training (NCTET), October 2002 – Present.
- Member, Educational Advisory Panel, Partnership for 21st Century Skills, October 2002 – Present.
- Member, Board of Directors, Julia Dyckman Andrus Memorial Children's Home, Yonkers, New York, 1999 - Present.

APPENDIX C

University of Memphis, Center for Research in Education Policy (UM/CREP)

The University of Memphis

Memphis, Tennessee 38152-3340

A State of Tennessee Center of Excellence
Center for Research in Educational Policy
325 Browning Hall

Local 901/678-2310
Toll 866/670-6147
FAX 901/678-4257

July 10, 2003

Ms. Jerry Bates
Tennessee Department of Education
Applied School Technology
Andrew Johnson Tower, 6th Floor
710 James Robertson Parkway
Nashville, TN 37243-0375

Dear Ms. Bates:

The Center for Research in Educational Policy is pleased to have the opportunity to serve as partner for the Tennessee EdTech Accountability Model (TEAM) project, to be proposed for the "Evaluating State Educational Technology Programs Grant Competition." CREP is currently extensively involved in research and accountability in educational technology applications and has developed a nationally-used formative evaluation system (FEPSI-TP) for assessment of technology integration progress and outcomes. We greatly look forward to participating on this important project.

Sincerely,

Steven M. Ross, Ph.D.
Center Director and Lillian and Morrie Moss Chair of Excellence in Urban Education

A Tennessee Board of Regents Institution
An Equal Opportunity/Affirmative Action University

The CNA Corporation

The CNA Corporation

A Non-Profit Research and Analysis Corporation

4825 Mark Center Drive • Alexandria, Virginia 22311-1850 • (703) 824-2000 • (703) 824-2942 FAX

July 22, 2003

Ms. Jerry Bates
Tennessee Department of Education
Applied School Technology
Andrew Johnson Tower, 6th floor
710 James Robertson Parkway
Nashville, TN 37243-0375

Dear Ms. Bates:

The CNA Corporation (CNAC) is pleased to partner with the Tennessee EdTech Accountability Model (TEAM) on the "Evaluating State Educational Technology Program Grants Competition." CNAC is currently extensively involved in research and accountability in educational technology through our Appalachian Technology in Education project, and we have engaged in several evaluation projects concerning the use of educational technology and the funding of virtual high schools. We also have a keen interest in developing effective models of teacher professional development leading to the effective integration of technology into the classroom, and resulting in higher levels of student achievement and technological literacy. We are excited about the opportunity of working with the State of Tennessee to better serve its students.

Please contact Mr. Dan Burke (703-824-2348; Email: (burked@cna.org), our proposed Project Director, with any questions or requests for additional information. We look forward to supporting the Tennessee Department of Education.

Sincerely,

Richard M. Moose
President
Institute for Public Research
The CNA Corporation

Appendix D: Evaluation Brief

Tennessee's EdTech Launch Program

Center for Research in Educational Policy

Below is a brief outline for the **pre ESETP** three-year external evaluation of Tennessee's EdTech Launch Program. The evaluation will utilize a matched-control design based on data collected from school-level Formative Evaluation Process for School Improvement (FEPSI) and student-level achievement and performance analysis.

Formative Evaluation Process for School Improvement (FEPSI)

The Formative Evaluation Process for School Improvement (FEPSI) will be conducted for each EdTech Launch school. The FEPSI will involve the collection of data from multiple sources including a teacher focus group, a school climate inventory, a teacher technology questionnaire, classroom observations, a principal interview, technology coach interview and survey and the establishment and review of school "benchmark" goals.

Each EdTech school will be responsible for the following items:
- Participate in faculty surveys (administered during a faculty meeting, 45 minutes)
- Participate in a teacher focus group (approximately 10 randomly-selected teachers, 1 hour)
- Participate in a principal interview (1 - 2 hours)
- Participate in a technology coach interview and survey
- Provide access to classrooms for trained observers (6 three-hour whole-school visits and 3 one-hour targeted visits to observe technology lessons.)
- Develop benchmarks for school improvement goals using CREP provided guidelines and examples

Student Achievement Study

The Student Achievement Study is a student-level study. The student-level evaluation will yield an analysis more sensitive than whole-school data analysis because it will control for student mobility, SES, prior achievement, and school variables by using student-level data. Such data permits "posttest" results to be adjusted for these variables and results to be disaggregated on basis of these variables. This extension will also employ student-level performance measures that are expected to be more sensitive to benefits of classroom technology integration than are conventional state-mandated standardized test scores (i.e., Tennessee Comprehensive Assessment Program or "TCAP").

The complete set of student outcome measures will include
- (a) TerraNova subtests—language, reading, mathematics, science, and social studies;
- (b) TCAP Writing Assessment
- (c) Problem-Solving Test, and
- (d) Technology Application Task.

Student-Level Research and Data Analysis Model: The detailed operational plan will compare student achievement outcomes in EdTech schools vs. matched control schools. The research organization provides the sampling strategies, testing schedules (for measures supplemental to TCAP), school and student-level program /control treatment matching schemes, and statistical analysis procedures. Control school candidates will be selected based on demographic similarities to EdTech schools, and their participation solicited.

Student Problem-Solving Analysis: A problem-solving analysis will assess students' ability to comprehend and solve higher-order problems. Written solutions by individual students will be assessed using a rubric comprised of 7 components x 3 performance levels (1 = low, 2 = moderate, 3 = high). The components are: 1) Understands problem, 2) Identifies what is know, 3) Identifies what needs to be known, 4) Determines data manipulation, 5) Describes use of technology, 6) Describes how to present findings, and 7) Collaborative learning. The problem task will be aligned with National and Tennessee's Curriculum Standards.

Technology Application Task: A technology application will be used in conjunction with the Problem-Solving Analysis. It will specifically ask students to *demonstrate* task-relevant technology applications as part of the problem-solving work product. Exemplary applications would encompass using a spreadsheet, constructing graphics and visual displays, analyzing data, etc. A rubric will be used to assess the appropriateness, depth, and quality of the technology applications.

Student Participants for Problem-Solving/Technology Task will be a subset of the entire evaluation population:
- 5 EdTech 7th Grade Classrooms = 125 students; 5 teachers
- 5 Control 7th Grade Classrooms = 125 students; 5 teachers

APPENDIX E
CNA Corporation

CNAC is a private, nonprofit research organization that has achieved an outstanding reputation for high-quality research, evaluation, and policy analysis services offering experienced education researchers well-versed in scientifically based research methodology. CNAC's education group has significant experience in the areas of educational technology, reform of K-12 education, teacher quality, and student achievement. In addition, CNAC staff has great expertise in the design, implementation and utilization of databases in education and training research.

Educational Technology
CNAC operates one of the ten Department of Education-funded Regional Technology in Education Consortia (ATEC), that provides KY, TN, WV, and VA support for the integration of educational technology into the classroom leading to increased student achievement and technological literacy. Through the research arm of ATEC, CNAC has conducted, among other studies, evaluations of the KY Student Technical Leadership Program (STLP) and the Kentucky and West Virginia Virtual High Schools.

Education Program Evaluation and Database Development
CNAC has conducted rigorous multi-site impact evaluations in various educational settings using a variety of quantitative and qualitative methodologies. We have used quasi-experimental designs as well as school-based experiments with random assignment of students and/or teachers to treatment and control conditions. We are familiar with the various content, formats, and styles of data files used in school districts nationwide, and have considerable experience working with large and complex databases. The following selected projects are examples of the strong impact evaluation capability of our team.

Empirical Research on Critical Factors in the Recruiting and Retention of the Mathematics and Science Teacher Workforce – CNAC is studying the relationship between teacher characteristics (demographics, education, professional development, test scores) and the academic outcomes of their students. This will then be linked to a study of the cost to districts to recruit and retain teachers with these characteristics so as to be able to optimize allocation of resources to build a high quality teacher workforce. As a portion of this work, CNAC developed a database that contains the complete history of all teachers in the Miami-Dade Public Schools for the past 12 years to the academic outcomes of their students. A comparable database Duval County (Jacksonville) teachers is being developed. .

Evaluation of Systemic Reform - In a study funded by NSF, CNAC evaluated the relationship between the implementation of systemic reform in mathematics and science education in school districts in Newport News, VA, Springfield, MA, and Winston/Salem/Forsythe County, NC and changes in teacher support (mentoring, professional development and behavior and student achievement). We determined the fidelity of implementation of the reform through analysis of surveys of all high school science and mathematics teachers and school principals; interviews with district administrators; and observation of a stratified sample of classrooms. CNAC conducted in-depth interviews of district administrators to determine the extent to which policy changes had been implemented to support the reform effort. We collected student achievement data, including scores on state algebra, science, and English tests, along

with student and teacher demographic data. We estimated a series of regression models to examine the relationship between implementation of the reforms, student achievement, and the contribution of teachers to improvement in achievement. An important finding from this study was the relationship between increased student achievement and particular teachers/classrooms.

An Empirical Study of National Board Certification in Miami-Dade County Public Schools – In this current study CNAC is using individual-level data to address the following questions: (1) Is National Board Certification (NBC) an effective signal for identification of highly skilled teachers, as measured by student outcomes? (2) Does the National Board Certification process increase the effectiveness of teachers who complete the certification process? (3) Are there spillover effects in schools that employ teachers who have NBC? (4) Are the benefits of NBC different in high- versus low-performing schools? (5) Are teachers who earn NBC more likely than their counterparts to remain in their school district following receipt of national certification?